North Carolina Department of Transportation
Division of Highways
Statewide Planning Branch

TOWN OF HOLLY SPRINGS THOROUGHFARE PLAN

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HOLLY SPRINGS
THOROUGHFARE PLAN

Prepared by:

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North Carolina Department of Transportation

In cooperation with:

Wake County
Federal Highway Administration

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TECHNICAL WORDS AND PHRASES

ADT - Average daily traffic.

Capacity - The formal definition of capacity is given on page 17. Maximum capacity occurs at LOS E.

Level of Service - The relationship of traffic volumes to the capacity of the roadway will determine the level of service. It is a rating system for such a relationship, similar to a report card. The table on page 18 defines the various levels of service A through F.

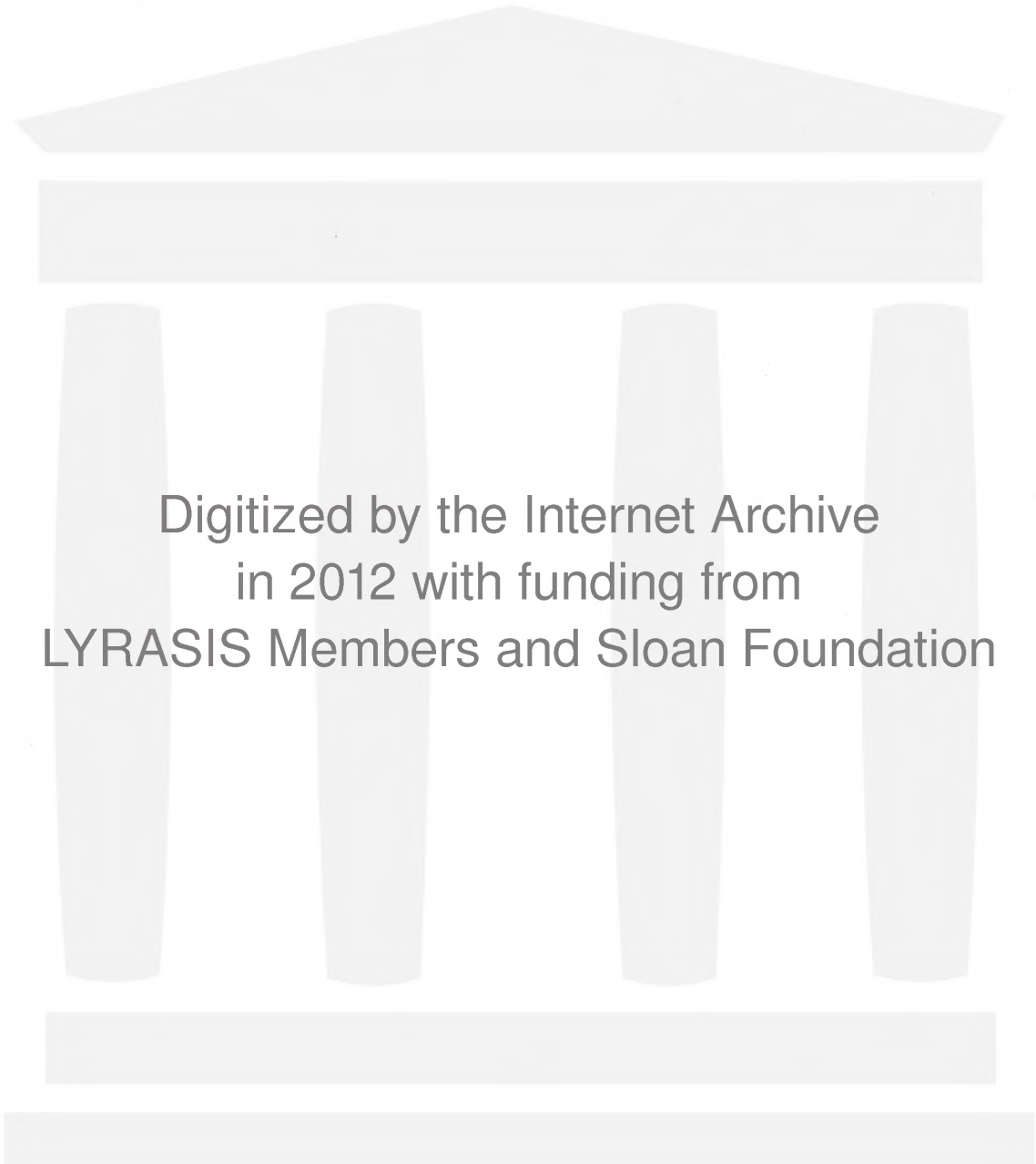
LOS - Level of Service

NCDOT - North Carolina Department of Transportation

Practical Capacity - This is defined as the capacity at a LOS D.

TIP - Transportation Improvement Program. A document produced yearly by the NCDOT which reflects the spending schedule for Transportation projects.

vpd - vehicles per day



I. INTRODUCTION

Transportation system efficiency, today more than ever, plays a vital role in out economy and way of life. It is used every day by the business, industrial and residential sectors. A thoroughfare plan is developed to insure that individual road projects eventually form a cohesive, coordinated system.

The previous Thoroughfare Plan for the Town of Holly Springs was adopted in 1985. The purpose of this study was to re-examine the present and future transportation needs of the area, and from this derive a revised Thoroughfare Plan. The system of thoroughfares proposed was developed following the principles of thoroughfare planning outlined in Chapter II of this report.

The recommended cross-sections are based on existing conditions and the expected volume of traffic in the design year. Due to the high growth potential of the Holly Springs area, spacing of corridors and growth beyond the planning horizon were also major factors in the recommendations. Before a project is implemented a more detailed evaluation will be performed. Every effort was made to use as much of the existing street system as possible in order to minimize cost and environmental disruption. Location of new facilities was based on field investigation, existing land use, and topographic conditions.

There are three key elements to the adopted Holly Springs thoroughfare plan:

1. The widening of existing streets. This plan provides the information needed for the protection of right-of-way along existing major routes such that future development will not prohibit needed improvements.

2. The proposed Holly Springs Bypass. NC 55 serves an area well beyond the confines of Holly Springs. Traffic increases will be due not only to local growth, but also to the demands for service to the Research Triangle Park from Fuquay-Varina, Harnett County, and trips originating as far away as Fayetteville. Attempting to widen the existing facility to accommodate the traffic would destroy the character of the Town. Complete control of access will also make the Bypass a safer facility.

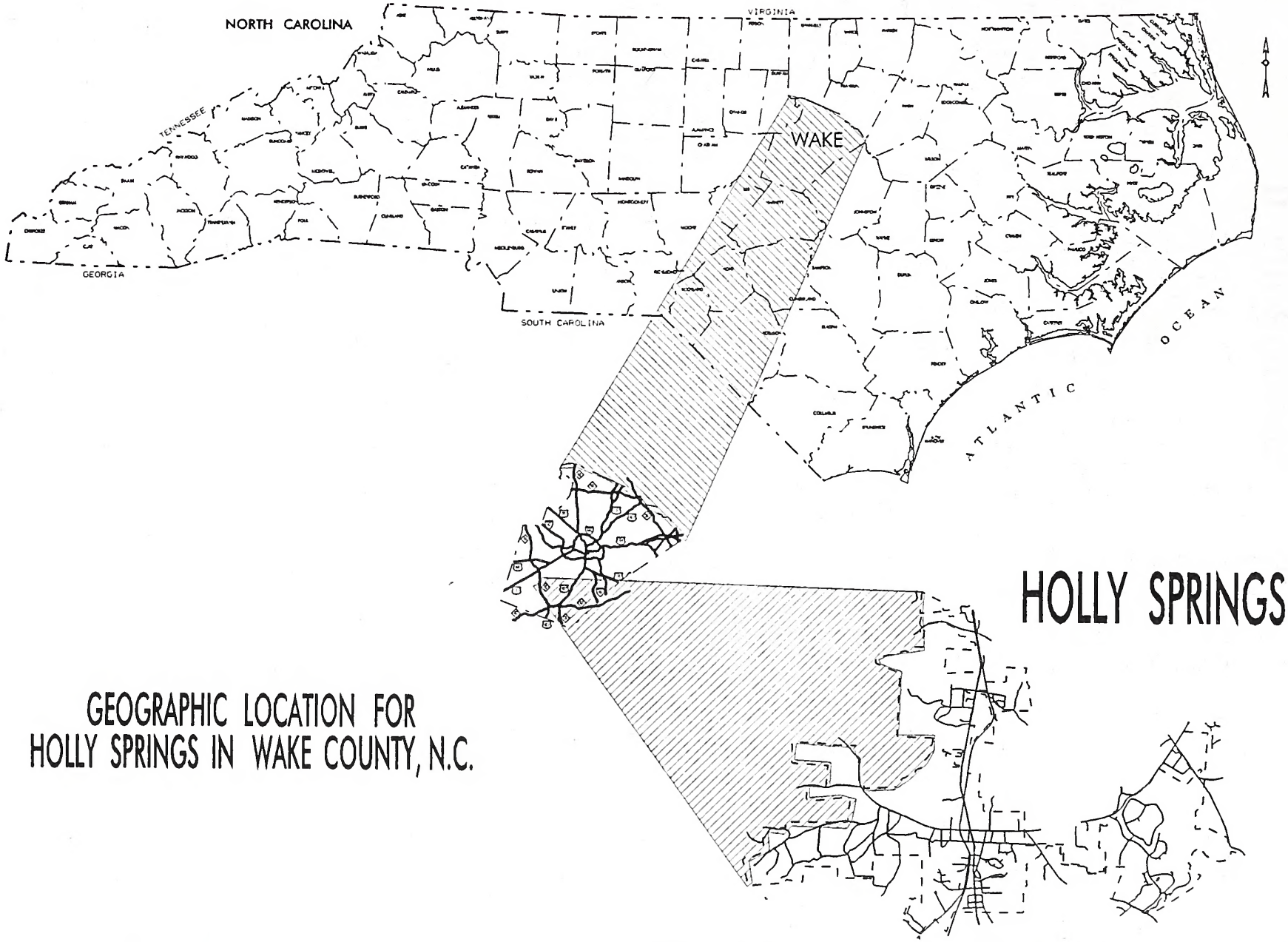
3. The proposed North Loop. It is critical for relief for the Holly Springs / Main Street intersection, which would experience intolerable congestion without it. The North Loop is a facility which serves Holly Springs residents, both to assure connectivity for major routes through the Town, and also as a spine route for the orderly and controlled growth of future developments.

This Thoroughfare Plan is intended to prepare the Town of Holly Springs for the expected high growth rate in the years ahead. Initiative for plan implementation will rest largely with the policy boards and citizens of the area. The scope of highway needs throughout the State greatly outweigh the available funding. It is, therefore, necessary that the local area continue to aggressively pursue funding for desired projects.

Responsibility for the proposed construction must be shared by Holly Springs and the N.C. Division of Highways. With the different governmental agencies involved in providing the elements of the plan, coordination of activities is of prime importance. The

plan was formally adopted by the Town of Holly Springs on May 18, 1995, the Transportation Advisory Committee of the Capital Area Metropolitan Planning Organization on May 18, 1995, and the North Carolina Board of Transportation on July 7, 1995, to serve as a mutual official guide in providing a well coordinated, adequate, and economical major street system. In order for the plan to be effective, the Town, County, and the State must procure in advance or protect by various legal controls the right-of-ways necessary for the improvements which will ultimately be required.

It must be emphasized that the Thoroughfare Plan was based on anticipated growth of the area. Actual growth rates and patterns may differ from those anticipated and it may become necessary to accelerate or retard the development of thoroughfares or to make revisions in the proposed plan. It is desirable to review the plan in detail approximately every ten years to adjust the thoroughfare system to the actual rate and type of development.



GEOGRAPHIC LOCATION FOR
HOLLY SPRINGS IN WAKE COUNTY, N.C.

FIGURE 1

II THOROUGHFARE PLANNING

The urban street system typically occupies 25 to 30 percent of the total developed land in the urban area. Since the system is permanent and expensive to build and maintain, much care and foresight are needed in its development. Thoroughfare planning is the process public officials use to assure the development of the most appropriate street system to meet future travel desires. This chapter will discuss the benefits of planning, ways to improve the efficiency of the existing transportation system, and the form of the "ideal" thoroughfare plan.

Purpose of Planning

There are many benefits to be gained from thoroughfare planning, but the primary objective is to assure that the street system will be progressively developed in such a manner as to adequately serve future travel desires. Thus, the cardinal concept of thoroughfare planning is that provisions be made for street and highway improvements so that as needs arise, feasible opportunities to make improvements exist.

Some of the benefits derived from thoroughfare planning are: (1) Each street can be designed to perform a specific function. This permits savings in right-of-way and construction costs, and encourages stability in travel and land use patterns. (2) Local officials and citizens are informed as to future improvements. Public facilities can be better located, and damage to property and appearance can be minimized (for example: buildings and plants can be located to permit future street widening). (3) Residents will know which streets will be developed as major thoroughfares and be able to make an informed decision when choosing a home. (4) City officials will know when improvements will be needed and can schedule funds accordingly. (5) Increase in travel safety.

The major steps involved in the thoroughfare planning process are:

1. Collection of data concerning existing physical development, land use, and travel desires within the area.

2. Prediction of future data, land use.

3. Evaluation of the adequacy of the existing street system in serving present and future travel.

4. Formulation of the best thoroughfare plan, on the basis of travel demand, economic benefits, and environmental considerations, to meet future travel desires.

5. Development of construction priorities for plan implementation.

6. Implementation of the plan.

Efficiency

Thoroughfare planning objectives are achieved through both improving the operational efficiency of thoroughfares, improving the system efficiency through system coordination and layout, and altering travel demand.

(1) Operational Efficiency - A street's operational efficiency is improved by increasing the capability of the street to carry vehicular traffic and people. In terms of vehicular traffic, a street's capacity is defined as "the maximum number of vehicles which can pass a given point on a roadway during a given time period under prevailing roadway and traffic conditions." Capacity is affected by the physical features of the roadway, the nature of the traffic, and the weather.

Physical ways to improve vehicular capacity include street widening, intersection improvements, improving the vertical and horizontal alignment, eliminating road-side parking and eliminating property access points. For example, widening of a street from two to four lanes more than doubles the capacity of the street by providing additional maneuverability for traffic. Operational ways to improve street capacity include:

(1) Control of access - A roadway with complete access control can carry over two times the traffic handled by a non-controlled access street.

(2) Parking removal - Increases capacity by providing additional street width for traffic flow and reducing friction to flow caused by parking operations.

(3) One-way operation - The capacity of a street can be increased up to 50%, depending upon turning movements and overall street width, by initiating one-way traffic operations. One-way streets can also improve traffic flow by decreasing potential traffic conflicts and simplifying traffic signal coordination.

(4) Reversible lanes - Reversible traffic lanes may be used to increase street capacity in situations where heavy directional flows occur during peak periods.

(5) Signal phasing and coordination - Uncoordinated signals and poor signal phasing restrict traffic flow by creating excessive stop-and-go operation.

(2) System Efficiency - A more efficient system can reduce travel distances, time, and cost. Improvements in system efficiency can be achieved through the concept of a functional order of streets and development of a coordinated major street system.

Functional Order - Streets perform two primary functions - they provide traffic service and land service. These two functions are basically incompatible. The conflict is not serious if both traffic and land service demands are low, but when traffic volumes are high, conflicts created by intense land service demands result in intolerable congestion.

The underlying concept of the thoroughfare plan is that it provides a functional order of streets which permits travel from origins to destinations with directness, ease, and safety. Different streets in the system are designed to perform specific functions, thus minimizing the traffic and land service conflict. Streets are categorized as to function as: local access streets, minor thoroughfares or major thoroughfares. It should be noted that the designation of a street as a local, minor or major thoroughfare, **does not** specify the cross-section of the street. Each street is individually evaluated for the proposed cross-section.

"Local Access Streets" provide access to abutting property. They are not intended to carry heavy volumes of traffic and should be located such that only traffic with origins or destinations on the streets would be served. **Their function is to provide access.** Depending upon the type of land use served, local access streets may be further classified as residential, commercial, and/or industrial.

"Minor Thoroughfares" are more important streets in the city system. They collect traffic from local access streets and carry it to the major thoroughfare system. They may, in some instances, supplement the major thoroughfare system by aiding minor through movements. A third function which may be performed is that of providing access to abutting property. They should be designed to serve limited areas so that their development as major thoroughfares will be prevented.

"Major Thoroughfares" are the primary traffic arteries of the town. Their function is to move intra-city and inter-city traffic. Although undesirable, the streets which comprise the major thoroughfare system may also serve abutting property; however, **their major function is to carry traffic.** They should not be bordered by strip development because such development significantly lowers the capacity of the thoroughfare, and each driveway is a danger to traffic flow. Major thoroughfares may range from two lane streets to expressways with six or more traffic lanes. As a general rule, parking should not be permitted on major thoroughfares.

(3) Altering Travel Demand is a third way to improve the efficiency of existing streets. Travel demand can be reduced or altered in the following ways:

(1) Encourage people to form carpools and vanpools for work and other trips. This reduces the number of vehicles on the roadway while increasing the people carrying capability of the street system.

(2) Encourage the use of mass transit, bicycles, and pedestrian travel.

(3) Encourage industries and business to stagger work hours or establish variable work hours for employees. This will reduce travel demand in peak periods and spread peak travel over a longer time period.

Idealized Thoroughfare System

The major thoroughfares can be considered as a coordinated system thoroughfares, forming the basic framework of the urban street system. A major thoroughfare system which is most adaptable to desire lines of travel within an urban area and which permits movement between various areas of the town with maximum directness is the radial/loop system. Thus, the major thoroughfare system can be thought of as consisting of the following elements:

Radial Streets - provide for traffic movement between points located in the outskirts of the town and the central area. This is a major traffic movement in most cities. The economic strength of a central business district depends upon the adequacy of this type of thoroughfare. Examples of a radial street would include Holly Springs Road and NC 55.

Circumferential or loop system streets - move traffic between suburban areas of the town. Although a loop may completely encircle the town, a typical trip may use only a portion of the loop. Loop streets do not necessarily carry heavy volumes of traffic (although they may), but their function to help relieve central areas.

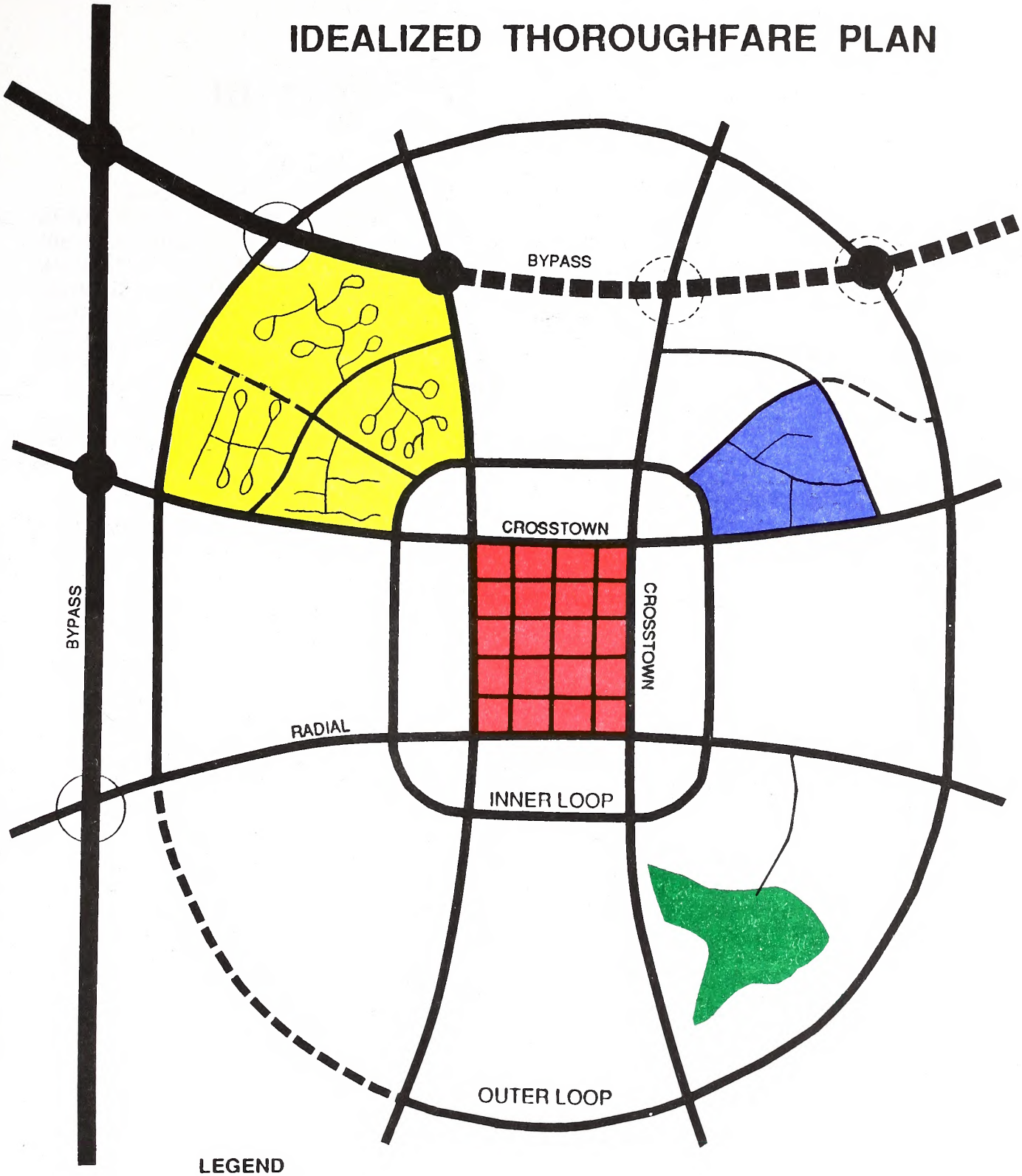
Bypass is designed to carry traffic through or around the urban area, thus providing relief to the town street system by removing traffic which has no desire to be in the town. Bypasses are usually designed to highway standards, with control of access. Bypasses may also serve as a portion of an urban loop. By freeing the local streets for use by shopping and home-to-work traffic, bypasses tend to increase the economic vitality of the local area.

Figure 2 shows the Idealized Thoroughfare System. This system is augmented by minor thoroughfares, local residential, commercial and industrial streets.

Application of Thoroughfare Planning Principles

The above descriptions are of an idealized major thoroughfare system. In actual practice, thoroughfare planning is done for established areas and is constrained by existing land use and street patterns, public attitudes, and expectations of future land use. Compromises must be made because of these, and other factors that may affect major street locations.

IDEALIZED THOROUGHFARE PLAN



LEGEND

	EXISTING	PROPOSED
MAJOR THOROUGHFARE FREEWAY	▬▬▬	▬ ▬ ▬ ▬
MAJOR OTHER	▬▬▬	▬ ▬ ▬ ▬
MINOR THOROUGHFARE	▬▬▬	▬ ▬ ▬ ▬
LOCAL ROAD	▬▬▬	
INTERCHANGE	●	●
GRADE SEPERATION	○	○

LAND USES

- COMMERCIAL/BUSINESS
- RESIDENTIAL
- INDUSTRIAL
- PUBLIC/INSTITUTIONAL

FIGURE 2

III. PLANNING CONSIDERATIONS

Three of the most significant factors influencing the transportation needs of any area are its population, economy, and land use. Examination of these factions helps to explain historic travel patterns and lays the ground work for thoroughfare planning. The existing street pattern and travel demand must also be considered and analyzed. Additional study items may include the effects of legal controls such as subdivision regulations and zoning ordinances, availability of public utilities, and physical features of the area.

Major Routes

North Carolina Highway 55 currently provides the Town of Holly Springs with its primary access to and from one of the State's largest population centers: the Raleigh-Durham metropolitan area. NC 55 is also a major link with Research Triangle Park, Raleigh-Durham International Airport, and highways of regional importance such as Interstate 40, and U.S. Highways 1, 64, and 401. Holly Springs Road (SR 1152) is another major route within the Town's jurisdiction. The road serves as an eastern link with Cary and Raleigh for the rapidly growing population of southern and western Wake County.

Population Trends

Travel is directly related to population, and the volume of traffic is closely related to the size and distribution of the population which it serves. Observing and studying past population trends helps to determine future populations and their distribution, which in turn helps to predict future travel demands.

TABLE 3.1
Holly Springs Population Data and Projections

Year	North Carolina	Wake County	H.S. Township	Town of Holly Sprg	City of Raleigh
1960	4,556,155	169,082	2,965	558	93,931
1970	5,082,059	228,453	3,578	697	121,577
1980	5,881,766	301,327	3,942	668	150,255
1990	6,632,448	426,301	5,786	908	212,092
1993	-	-	-	2,407	-
2000	7,382,458	552,607	-	6,000	-
2005	7,708,505*	615,182*	-	-	297,482

Sources: historic: US Bureau of Census
local projection by Town of Holly Springs Planning
* Office of State Budget and Management 1/1994

Listed above in Table 3.1, are the population totals for the Town of Holly Springs and surrounding areas. Raleigh was included in the data because of its proximity to Holly

Springs. As the Raleigh area becomes more crowded due to increases in population, more people will be looking to the surrounding towns for homes. This point is reflected in the population figures for Holly Springs. (It is important to note, when examining the above data, that Holly Springs is growing not only in population, but also in land area.) A December 1993 report in the Raleigh News and Observer stated that virtually all the working population in Holly Springs (95%) commuted outside the Town's jurisdiction to reach their place of employment. With access to other areas a priority among residents, the road network in and around the Town could enhance or hinder any future growth.

Holly Springs experienced unprecedented growth over the last few years. From 1990 to 1992 the Town grew at a rate of 34.7% which led all other Wake County municipalities and ranked third statewide among towns of similar size.

Economy

The economic stability of a given area is an important factor to consider when estimating future travel demands. An area with a good economic base and job market will attract businesses and people which leads to increased development and economic growth. According to the Wake county employment figure in Table 3.2, the total average employment in Wake County has increased steadily from 178,668 people in 1983 to 251,753 people in 1990. Considering these past trends and the area's evident economic stability, it would be logical to expect continued increased employment in Holly Springs.

TABLE 3.2
Wake County Employment

	1990	1986	1983
Total Average Employ.	251,753	205,062	178,668
Industry Employment			
Manufacturing	28,717	25,874	25,531
Services	60,877	41,250	33,883
Construction	14,589	17,043	15,328
Transportation	16,589	11,532	10,237
Trade	61,153	50,566	41,565
Finance	16,456	13,239	10,779
Mining	332	279	206
Agriculture	1,975	1,317	889

Source: Employment Security Commission
"Transportation" includes transportation, commerce and public utilities; "Finance" includes finance, insurance and real estate; "Agriculture" includes agriculture, forestry and fishing.

Land Use

The generation of traffic on any street is closely related to the manner in which the land surrounding that street is used. Different types of land uses generate varying volumes of traffic. The spatial distribution of these different types of land uses is the main determinate of when, where, and why traffic congestion occurs. By designating land uses into different types one can determine the spatial distribution of existing land uses which

helps predict future land uses and resulting travel patterns.

The largest employers in Holly Springs are located either on or west of NC 55. Figure 3 shows the Town's zoning map. The majority of the land zoned for industrial use in found west of NC 55 while property zoned for commercial use is found adjacent to NC 55. High density residential areas are found to the east, south, west and center of Town. Even though a great deal of land surrounding Holly Springs is zoned R-20 (or residential agricultural), traditional agricultural activities have been increasingly replaced and residential development. Increases in the intensity and scope of all kinds of development are predicted well into the future. A recent example of this would be the residential development along Avent Ferry Road in the southern part of Town.

Travel Demand

Traffic counts are one of the best means of gauging traffic demand at any given point or location along a roadway network. The Statewide Planning Branch of NCDOT has taken the most recent traffic counts in the Holly Springs area. The values listed in Table 3.3 reflect the total volume of traffic entering each specified intersection.

TABLE 3.3
Daily Traffic Counts (June 1993)

Intersection	Total Entering Volume
NC 55 and Holly Springs Road	15,565
NC 55 and Sunset Lake Road	14,536
NC 55 and Easton Street	13,682
NC 55 and Earp Street	13,627
NC 55 and Avent Ferry Road	12,557
NC 55 and Elm Street	9,658
NC 55 and Ralph Stephens Loop Road	8,633
Holly Springs Road and Sunset Lake Rd.	6,444
Piney Grove-Wilburn and Avent Ferry	3,908

Environmental and Social Factors

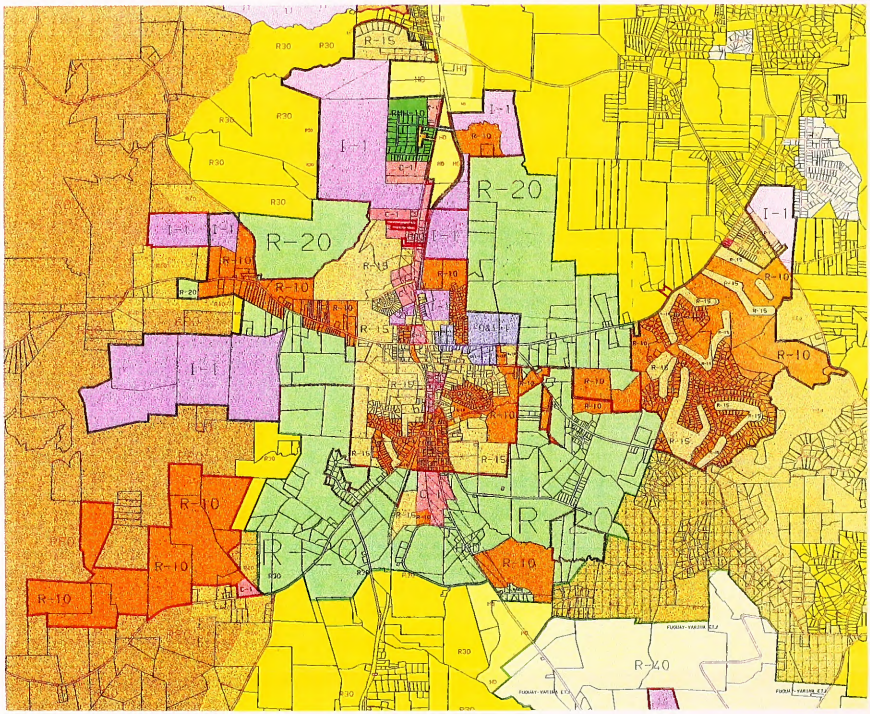
A review of information provided by the North Carolina Department of Environmental, Health, and Natural Resources -Division of Parks and Recreation, revealed no records of any known "high quality natural communities" or "significant natural areas" occurring in the proposed thoroughfare planning area. NCDEHNR does, however, have records of a **rigid sedge (carex tetanica)** a plant species significantly rare to North Carolina existing in the area. A rigid sedge population was last observed in 1963 in a boggy area north of Holly Springs. A field survey is needed to determine the status of the rare plant species. The proposed thoroughfare plan should not significantly affect the existence of the rigid sedge if the plant is indeed still present.

A review of information provided by the North Carolina Department of Cultural Resources - Division of Archives and History, revealed several known archaeological sites within the Town's jurisdiction. No sites were, however, in direct conflict with any of the proposed elements contained in the thoroughfare plan. Holly Springs Planning

Department reviewed a list of historic properties in the area, which revealed several sites worthy of investigation for inclusion on the National Register of Historic Places. None of the historic properties will be endangered by any element of this plan.

In addition, no commercial, residential, or recreational facilities appear to be threatened by any of the projects listed in the thoroughfare plan. No existing neighborhoods, subdivisions, or communities would be divided by any of the proposed projects.

HOLLY SPRINGS ZONING



LEGEND

C-1	R-20
I-1	RMH-10
O&I-1	HOD*
R-10	CORP
R-15	ETJ

WAKE COUNTY GEOGRAPHIC INFORMATION SERVICES

FIGURE 3

IV. ANALYSIS OF THE EXISTING SYSTEM

This chapter discusses travel deficiencies and the concept of "roadway capacity." Travel deficiencies may be localized and the result of substandard highway design, inadequate pavement width, or intersection controls. Alternately, the underlying problem may be caused by a system deficiency such as a need for a bypass, loop facility, construction of missing roadway links, or additional radials.

Capacity

An indication of the adequacy of the existing street system is a comparison of traffic volumes versus the ability of the streets to move traffic. In an urban area, a street's ability to move traffic is generally controlled by the spacing of major intersections, access control, width of pavement, and the traffic control devices (such as signals) utilized.

Capacity is the maximum number of vehicles which has a "reasonable expectation" of passing over a given section of a roadway, during a given time period under prevailing roadway and traffic conditions. The relationship of traffic volumes to the capacity of the roadway will determine the level of service (LOS). Six levels of service identify the range of possible conditions. Figure 4 shows the levels of congestion associated with the various levels of service. Table 4.1 gives a brief description of each LOS in accordance with the 1985 Highway Capacity Manual.

The recommended improvements and overall design of the Thoroughfare Plan were based on achieving a minimum of LOS D on existing facilities, and LOS C on new facilities. LOS D is considered the "practical capacity" of a facility, or that at which the public begins to express dissatisfaction.

An analysis of the base year street system was made to determine the location, nature, and extent of existing or future capacity deficiencies in traffic-carrying capability. Any given roadway's ability to move traffic is a function of a number of considerations, including:

- Geometrics of the road
  - number of lanes and width
  - turning lanes, if any
  - horizontal and vertical alignment
- Characteristics of side-roads
  - spacing of cross street intersections
  - traffic volumes on cross streets
- Typical users of the road
  - commuters vs. recreational travelers
  - bicycles in travel lanes
  - percent and type of heavy vehicles (trucks)
- Regulatory controls
  - Level of access control
    - restriction of driveways
    - restriction of intersections
  - traffic control devices (stop signs, traffic signals)

- posted speed limit

- Traffic characteristics
  - directional distribution
  - peaking characteristics

Because of these many factors, and due to the changing nature of roads, it is difficult to determine an exact point at which a road will reach its capacity.

TABLE 4.1
Level of Service (from AASHTO 1984)

LOS A - describes primarily free flow conditions. The motorist experiences a high level of physical and psychological comfort. The effects of minor incidents or breakdowns are easily absorbed.

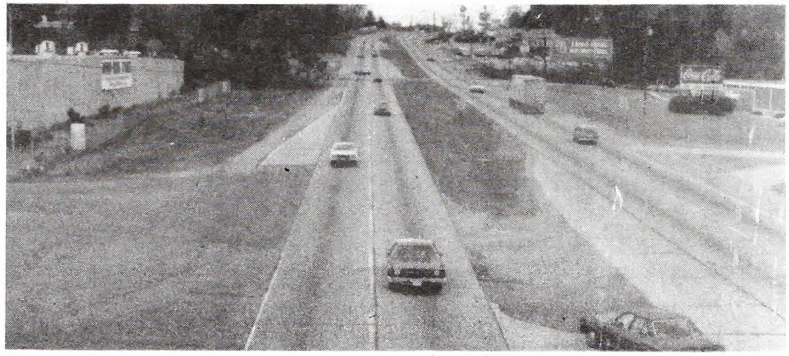
LOS B - also represents reasonably free flow conditions. The ability to maneuver within the traffic stream is only slightly restricted.

LOS C - provides for stable operations, but flows approach the range in which small increases will cause substantial deterioration is service. Freedom to maneuver is noticeably restricted. Minor incidents may still be absorbed, but the local decline in service will be great. Queues may be expected to form behind any significant blockage.

LOS D - borders on unstable flow. Small increases in flow can cause substantial deterioration in service. Freedom to maneuver is severely limited, and the driver experiences drastically reduced comfort levels. Minor incidents can be expected to create substantial queuing. On an urban arterial, LOS D corresponds to an average travel speed of 9 to 17 mph.

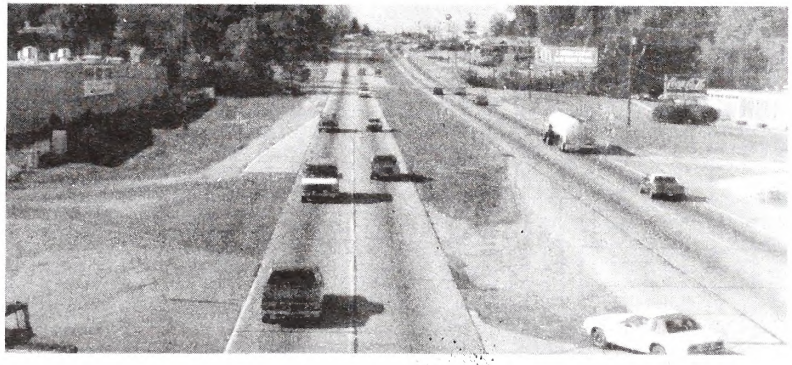
LOS E - The boundary between LOS D and LOS E describes operation at capacity. Operations at this level are extremely unstable, because there are virtually no usable gaps in the traffic stream. Any disruption to the traffic stream, such as a vehicle entering from a ramp, or changing lanes, requires the following vehicles to give way to admit the vehicle. This condition establishes a disruption wave which propagates through the upstream traffic flow. At capacity, the traffic stream has no ability to dissipate any disruption. Any incident can be expected to produce a serious breakdown with extensive queuing.

LOS F - describes forced or breakdown flow. Such conditions generally exist within queues forming behind breakdown points.

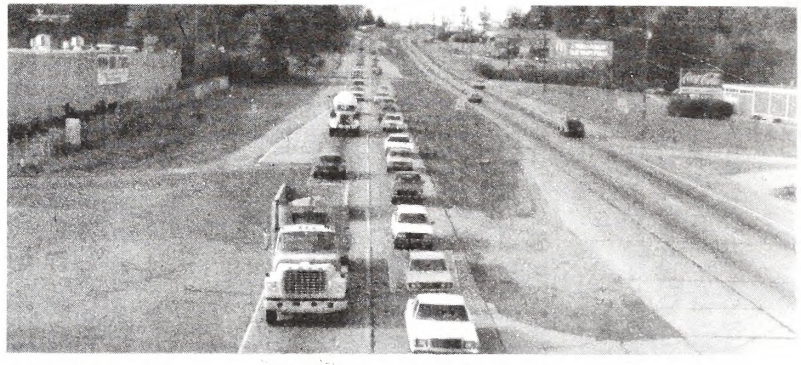


LEVEL OF SERVICE - A

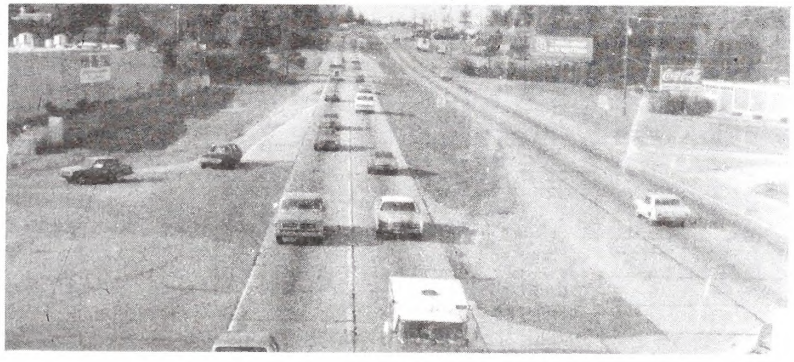
LEVEL OF SERVICE - D



LEVEL OF SERVICE - B



LEVEL OF SERVICE - E



LEVEL OF SERVICE - C

LEVEL OF SERVICE - F

LEVELS OF SERVICE

FIGURE 4

Existing Travel Patterns

System planners rely on empirically developed standards, studies of the "nature" of the area's existing and anticipated travel desires and feedback from the local staff and the public on streets experiencing traffic problems. The following are examples of facilities which are expected to have capacity deficiencies by the design year are NC 55, and Holly Springs Road.

System Deficiencies - System deficiencies are a measure of the extent to which the existing system lacks continuous radials, loops, cross-towns, and bypasses. System deficiencies in the system include:

- an alternate route for north-south traffic, such as the proposed NC 55 Bypass;
- a loop system is needed around the western and southern parts of the Town to connect radial streets and relieve through traffic congestion in the Town; and
- extensions of existing streets and connectivity of roadways is needed to eliminate a "funnelling" affect of traffic onto two or three main arteries.

Traffic Accidents

Traffic accident records are of assistance in defining problem areas and often pinpoint a deficiency such as poor design, inadequate signing, ineffective parking, poor sight distance, or inadequacy to handle traffic demands. Accident patterns developed from analysis of accident data can lead to remedial action reducing the number of accidents (such as the need for an exclusive turn bay).

Both the severity and number of accidents should be considered when investigating accident data. The severity of every accident is measured with a series of weighting factors developed by the Division of Highways of the NCDOT. In terms of these factors, a fatal or incapacitating accident is 47.7 times more severe than one involving only property damage, and an accident resulting in minor injury is 11.8 times more severe than one with only property damage.

Table 4.2 (below) shows locations with three or more accidents in Holly Springs between 6/92 and 6/95. The "Accidents" column indicates the total number of accidents reported within two hundred (200) feet of the intersection during the indicated time period. The severity (SEVR) listed is the average accident severity for that location. The number of accidents in Holly Springs is increasing as the area grows, as indicated in Table 4.2 below (which compares last year's accidents with the accidents of the previous two years).

Traffic Forecasts

The Holly Springs Thoroughfare Plan report uses traffic projections for the year 2010 which were derived using trend line analysis coupled with information concerning current and future land uses. Future updates to the plan are anticipated to use a computer model of the Triangle Region, which will include Holly Springs.

TABLE 4.2 Accident Summary 6/92-6/95				
LOCATION	ACCIDENTS 1 YEAR 6/94 to 6/95		2 YEARS 6/92 to 6/94	
	NO.	SEVR.	NO.	SEVR.
1. NC 55 / Third Street	9	1.82	3	7.03
2. NC 55 / Holly Springs Road	5	1.00	10	2.81
3. Holly Springs/Sunset Lake	6	2.24		
4. NC 55 / Avent Ferry Road	2	4.70	4	16.75

Note : NC 55 is also known as Main Street
Holly Springs Rd is also known as SR 1152, and is New Hill Rd west of NC 55
Sunset Lake Road is also known as SR 1301

Air Quality

Holly Springs is located within Wake County, which is classified as maintenance for ozone and carbon monoxide. As Holly Springs lies outside any computer modeled area, projects must be examined on a case by case basis as a part of the environmental document process. Additionally, as Holly Springs is part of the Capital Area Metropolitan Planning Organization (CAMPO), Holly Springs projects in the State Transportation Improvement Program will be included as needed in air quality analysis. This analysis is performed by NCDOT Statewide Planning for consideration by the MPO in making the air quality conformity finding.

V. RECOMMENDATIONS

There are infinite options for addressing a transportation system. In this chapter, the advantages and disadvantages of a "do nothing" alternative are explored, as well as various non-construction alternatives available to the area. Lastly, detailed recommendations for specific facilities are included.

Alternative Plans

The process of developing, testing and evaluating alternate plans involve a number of considerations. These include identified deficiencies, environmental impacts, existing and anticipated land development, and travel service. Aerial photography, topographic mapping, field reconnaissance and recommendations from town staff, officials and interested local citizens provided additional basis for identifying and evaluating alternative alignments.

Do Nothing Alternative

A "do nothing" alternative was considered in weighing the desirability of developing a thoroughfare plan. This plan is essentially as the name implies, there are no major construction improvements to the system. Regular maintenance would still be performed. Some of the major advantages of the "do nothing" alternative are:

(1) No capital investment.
(2) No removal of landscaping.
(3) No additional land acquisition.
(4) No displacement of people or business as a result of construction.

However, there are a number of disadvantages to a "do nothing" policy which would have significant adverse effects on the urban environment. These include:

(1) Increased traffic congestion on major streets will cause traffic to divert to residential streets.
(2) Existing problem and "bottleneck" situations would worsen.
(3) Increased driving time and road user costs.
(4) Increased air pollution induced by traffic congestion.
(5) Reduced mobility for emergency vehicles.

Non-Construction Alternatives

In addition to the do nothing plan, it is desirable to take a more in depth look at the existing street system to determine if non-construction projects can enable the existing system to serve future travel. The applicability of non-construction projects to the Planning Area is as follows:

- Control of access increases capacity where highway capacity is reduced by large volumes of turning traffic at many closely spaced locations, such as at a strip commercial zone. As new development occurs, it would be beneficial to attempt to reduce or limit the number of curb cuts. As the remainder of Holly Springs Road, NC 55 (and to a lesser extent all major thoroughfares) develop, the transportation

network would benefit from the restriction of future and existing access points.

- The implementation of one-way streets could increase the capacity of the facilities by up to 50 percent. However, the street network of Holly Springs does not lend itself to this type of system, and it is therefore not proposed.

- Improving the progression of the traffic by updating the traffic signal phasing and coordination provides a capacity increase. Prior to a traffic signal being installed on a facility, the through movement is permitted continuously. Upon signal installation, the time permitted for the through movement is significantly reduced to allow for conflicting movements, possibly by as much as fifty percent. This results in a reduced capacity for the facility. Signal locations on NC 55 and Holly Springs Road should be coordinated to provide for progression.

- An aggressive carpool, vanpool, or public transit program would process the same number of person-trips while decreasing the number of vehicle-trips and thus decrease congestion. Currently Holly Springs does not have an historical pool of vehicle occupancy data to analyze for evaluation of the possible benefits of such a program. Further study of mass transit options will be undertaken as part of the Triangle Regional Model study which includes the Capital Area Metropolitan Planning Organization (CAMPO) of which Holly Springs is a part.

- Altering work hours such that the beginning and ending times are staggered, can reduce travel in the peak hour. The resulting peak period would be less congested, but last longer. Therefore, the total traffic carrying ability of an existing street can be increased.

- Restrictions on growth would also slow traffic growth, and delay the need for street improvements. This approach could adversely affect the economy of the Planning Area. Any approach of this nature would have to be a local decision, and is not being recommended here.

The "do nothing" and "non-construction alternative" concepts are not viable for the solution to existing and future transportation problems in the planning area. Elements of the "non-construction alternatives" should be pursued by the Town as part of the overall transportation planning solution. These elements, more fully described above, include: control of access, signal progression, an aggressive carpool program, and promotion of altering work hours.

Traffic Operations

Traffic signal progression should be studied and revised as needed. As a part of the study, locations for future signals should be considered to provide for future progression patterns, especially for NC 55 and Holly Springs Road, as they serve longer distance trips. It should be stressed that contrary to popular belief, traffic signals are **rarely** the solution to traffic problems, and in fact worsen the problem if utilized incorrectly.

Facilities should be designed such that the integrity of the road is not compromised with excessive curb cuts. On major thoroughfares, developments should be encouraged to provide property access from an internal street system. Other options for reducing curb cuts includes shared driveways.

There are two-lane roads in the Holly Springs area which have paved widths less than 22', which is the **minimum desirable cross-section.** The minimum desirable lane width is 11', while the desirable lane width of 12' yields a 24' paved roadway. Narrow roadways increase the likelihood of accidents between vehicles traveling in the opposite direction, or when bicyclists share the roadway. This becomes more critical as traffic increases to 5,000 or 6,000 vpd, as there is increased incidence of meeting oncoming traffic.

Adoption of the Plan

The Town of Holly Springs adopted the previous thoroughfare plan on June 4, 1985. Since 1985, the Town has experienced unprecedented growth and as a result of that rapid growth several elements of the 1985 thoroughfare plan became obsolete or simply not feasible. In some instances, development was allowed to occur in the path of proposed elements on the plan. Recognizing the need for a plan which could be implemented and used as an integral part of everyday planning, the Town of Holly Springs Planning Department spearheaded the effort to update the plan. The 1994 plan reflects several deviations from the 1985 plan and adds elements where needed.

1. The 1994 plan encompasses an expanded area due to several annexations since 1985.
2. Eastern Loop around Holly Springs is no longer an option due to existing development.
3. The Proposed NC 55 Bypass alignment has changed from the alignment on the 1985 Plan.
4. Several 1985 extension projects were eliminated due to development.
5. The 1994 plan provided for additional connectivity of transportation elements, such as the extension of Stinson St., Third St. and West Lane.

The Town of Holly Springs held a "drop in" session on June 21, 1994, where the public was invited to look at the proposed plan in an informal setting, with the opportunity of one-on-one dialogue. The plan resulting from this was presented to the Planning Board on July 26, 1994. Holly Springs planning staff met with planning staff from Wake County, Apex, and Fuquay-Varina to coordinate the proposed plan with the neighboring jurisdictions. Throughout the study process, the local staff worked with NCDOT Statewide Planning staff. The Proposed Thoroughfare Plan was adopted by the Town of Holly Springs on August 16, 1994, after a public hearing was held.

The Town of Holly Springs amended the 1994 Plan. Only minor adjustments were made, such as the extension of Ballentine to tie to Irving Parkway. A public hearing was held on March 21, 1995. The Town of Holly Springs staff coordinated with adjacent jurisdictions, NCDOT Statewide Planning and Wake County. The Plan was adopted by the Transportation Advisory Committee of CAMPO on May 18, 1995, and also by Town of Holly Springs on the same date. The Plan was mutually adopted by the North Carolina Board of Transportation on July 7, 1995.

Recommendations

The following sections describe the thoroughfare system in detail. A street by street inventory which includes existing and recommended cross sections, is shown in Appendix B.

Major Thoroughfares

Southern Wake Expressway: The Southern Wake Expressway (SWE) is a portion of the "Outer Loop", a multi-lane freeway which encircles Apex, Cary, Garner, Morrisville and Raleigh. The idealized thoroughfare plan concept in Chapter II of this report discusses a radial/loop system. The demand for suburb-to-suburb travel results in a desirable spacing of freeway loops approximately every 4 miles. While the reality of existing development, environmental concerns, Umstead Park, and the RDU Airport to not allow for the ideal spacing, the Outer Loop does provide for this function.

The environmental document for the SWE has not been scheduled in the State's Transportation Improvement Program (TIP). However, much work and an environmental screening has been accomplished to allow for a functional design of the facility. This design has been provided to all the affected local governments, as well as Wake County, so that it can be considered in land use planning, development, and for public knowledge. Additionally, the NCDOT is working to put the SWE under corridor protection, by means of two Official Corridor Maps (further discussed in Chapter VI). The public hearing on portion from NC 55 to US 401 was held in the summer of 1995. It is anticipated that the map will be filed in early 1996. Interchanges on the Outer Loop which will serve Holly Springs are located at Holly Springs Road and NC 55 Bypass.

NC 55 (Main Street): North Carolina Highway 55 is a two-lane facility which runs in a north-south direction through the old core of Holly Springs. A three lane section of NC 55 exists from the Holly Springs Road intersection to the Raleigh Street intersection. The current three lane section of NC 55 is adequate to serve the expected travel demands through the core of Town.

From the intersection with Holly Springs Road northward to the Proposed Outer Loop, a need exists for a multi-lane facility. TIP Project R-2905 proposes widening NC 55 to a five lane facility from Holly Springs Road northward to US 1. The environmental document is scheduled to begin in 1995. TIP Project R-2907 also calls for the widening of NC 55 to five lanes, from the Proposed Bypass's southern terminus southward towards Fuquay-Varina, with the planning work starting in 1996. Coupled with the Proposed NC 55 Bypass, the widening of NC 55 will ensure a safer and more efficient flow of traffic along the NC 55 Corridor.

NC 55 Bypass: this facility is included in the State's TIP, as project R-2541. The project calls for two lanes to be built on multi-lane right-of-way. Construction on this project is scheduled to begin in 1997. The Bypass is a partially controlled facility. No driveways will be allowed. Additionally, all public access points must be determined cooperatively between NCDOT and the Town. This facility will serve to split the traffic currently on NC 55, thus alleviating congestion.

Holly Springs Road (SR 1152): SR 1152 is currently the major east-west connector serving the Town of Holly Springs. The current two lane facility is gaining popularity among the commuters of Southern Wake County. The existing roadway needs to be enhanced to a five lane roadway with a ninety foot right of way. The Town has

expressed interest in design considerations which will accommodate bicycle, pedestrian and motor vehicle traffic. Any future roadway projects should first focus on the section of Holly Springs from NC 55 to Bass Lake Road to the intersection with Kildaire Farm Road, which will ultimately be the location of an interchange with the SWE. Holly Springs Road is a crucial link between Holly Springs and the Cary-Raleigh area and should be enhanced in order to maximize intra-city flow capacity and to provide better flow to and from the proposed Wake Outer Loop intersection at Kildaire Farm Road.

New Hill Road (SR 1152): New Hill Road is the major route for heavy truck traffic traveling to either the Town's Industrial Park or to landfill sites located west of NC 55. The current two lane roadway is woefully inadequate to handle the heavy truck traffic utilizing the facility. A multi-lane urban roadway will be needed in order to ease the flow of truck traffic using New Hill Road and special considerations for pavement design may be needed due to heavy truck traffic. The proposed NC 55 Bypass is scheduled to form an "at grade" intersection with New Hill Road near the present fork of the road. Every effort should be made to ensure the intersection is developed in a manner that will promote unobstructed and unencumbered traffic flow.

Avent Ferry Road (SR 1115): Avent Ferry Road extends from Holleman's Crossroads northward to NC 55 at Center Street in Holly Springs. The existing two lane facility is used by oversized truck traffic and recreation boat traffic in addition to commuter traffic. Avent Ferry Road is also home to a number of small to mid-sized residential subdivisions and plans are currently underway for a 1200 lot subdivision. The expected residential growth along Avent Ferry Road in addition to the boat and truck traffic currently using the facility will render the roadway inadequate for the projected travel demand. Avent Ferry Road will need to be widened to a four or five lane facility. The Town has indicated a desire for sidewalks and bicycle lanes for this facility. The proposed NC 55 Bypass will create an at-grade intersection with Avent Ferry Road near Trotter Bluffs subdivision. Every effort should be made to ensure development near the intersection adheres to sound transportation planning principles.

Bass Lake Road (SR 1393): Bass Lake Road extends from an intersection with Sunset Lake Road northward to Holly Springs Road. The roadway section from the Bass Lake Road Bridge to Holly Springs Road is currently a two lane facility. The recommended design is widening to a multi-lane lane facility.

Sunset Lake Road (SR 1301): Sunset Lake Road (SSLR) intersects with NC 55, Holly Springs Road, and Bass Lake Road and serves as the eastern boundary for the Town's perimunicipal planning area. To handle increased residential development and commuter traffic, Sunset Lake Road will need to widened to a multi-lane facility. In addition, the intersection with Holly Springs Road needs to be improved in order to allow for a stop light, and consideration for the safety of pedestrian and bicycle traffic at this location is important. Finally, the portion of SSLR near the lake dam and bridge should be straightened in order to maximize the carrying capacity of the roadway and to increase safety.

North Eastern Loop (to be named later): The proposed loop will connect Holly Springs Road with NC 55 and the proposed NC 55 Bypass. The roadway should be a four lane facility. The Town has indicated a desire for bicycle and pedestrian user areas.

South Eastern Loop (to be named later): The proposed south eastern loop connects NC 55 and the proposed southern terminus of the NC 55 Bypass with the proposed Stinson Street Extension. The roadway should be a four lane facility. The Town has indicated a desire for the provision of bicycles and pedestrians use areas.

Irving Parkway: Irving Parkway is a two lane facility located on a 100 foot right-of-way which serves an Industrial Park to the west of Town. In order to better serve anticipated movement difficulties along New Hill Road, Irving Parkway needs to be extended to form an industrial entrance with the NC 55 Bypass. The existing roadway and proposed extension should be widened to three lanes on the existing 100 foot right of way. The potential for heavy truck traffic should be considered in pavement design.

Minor Thoroughfares

Ballentine Street: Ballentine Street extension provides direct access west to NC 55 Bypass, which will relieve congestion at the NC 55/Holly Springs Road intersection. This will facilitate travel to the SWE, and on to the Research Triangle Park area. Additionally it will provide for traffic between the residential community and jobs in the industrial sites along Irving Parkway.

Cayman Avenue: Cayman Avenue serves the Windward Pointe subdivision. Cayman Street should be extended in order to connect with NC 55 in order to provide an additional entrance into the subdivision. As development in the area occurs, Cayman Avenue should be required to extend northward and connect the subdivision with the proposed Stephenson Road Extension.

Elm Street: West Elm Street currently serves Avent Acres subdivision while East Elm Street connects Avent Ferry Road with NC 55 and Grigsby Avenue. West Elm Street is a stub out at the terminus of Avent Acres. West Elm Street is to be extended to the north on new location to tie with New Hill Road and with other dead-end streets south of New Hill Road. This will alleviate some of the pressure on the NC 55 / Holly Springs Road intersection.

Raleigh Street: Raleigh Street is a two lane facility which connects Holly Springs road to NC 55 to the south. The current roadway adequately handles traffic flow. An urban cross-section with curb and gutter and sidewalks is desired by the Town. Raleigh Street should be maintained in a manner which would serve to protect the historical character found along the roadway. If possible, a slight re-alignment of Raleigh and Grigsby streets to make this a through move, would improve the traffic characteristics of the area.

Stinson Street: Stinson Street is a two lane, dead end facility serving the old elementary school building. The road should be extended and widened to a three lane facility in order to form a connector with Bass Lake Road.

LOCAL STREETS

BLALOCK Street, BURT & EARNIE Lanes, DOUGLAS Street: All three of these western Holly Springs dead-ends should be interconnected in a fashion which would promote connectivity with areas to the south and east.

Hillside Road: Hillside Road is an unimproved, two lane roadway. Hillside Road should be extended, paved and connected to Dogwood Road.

Thomas Mill Road: Thomas Mill Road is a dead end, unimproved roadway located adjacent to Irving Parkway. Thomas Mill Road should be extended and paved to

intersect with New Hill Road.

Summary of Recommendations

This report contains numerous recommendations for the Holly Springs transportation system. The following is a brief review of these recommendations.

Cross-sections - Each facility on the Thoroughfare Plan is discussed in detail earlier in this chapter. A summary of the recommended cross-sections for each facility is in Appendix B. The minimum desirable cross-section is twenty-two feet with paved shoulders or curb and gutter. The desirable lane width is twelve feet.

Bicycle Lanes - The Town of Holly Springs has expressed a desire to provide for bicycle usage along several of the facilities serving the Town. The outside lanes of a facility can be widened an additional two feet to accommodate a "share the road" concept, where safety allows. The Town is encouraged to develop a bicycle plan. The NCDOT has policies concerning bicycle and pedestrian facilities. These have been provided in the appendix of this report.

New Facilities - New facilities are needed throughout the planning area. They provide for continuity of travel, corridor spacing, and/or a more direct travel path. Some of the more important new facilities recommended by the Plan include: NC 55 Bypass, Southern Wake Expressway, and South Eastern Loop. Many smaller proposed facilities provide for improved connectivity of the transportation system.

Systems Improvements - Often system improvements can provide additional capacity or improved traffic conditions, with a minimum of capital outlay. Recommended system improvements include:

- Consideration of an aggressive carpool/vanpool program and collection of vehicle occupancy count data. The capacity of a facility to carry people can be increased by increasing the occupancy of the existing vehicles. Holly Springs should pursue this end both as a Town, and as a member of CAMPO.

- Encouragement of local businesses to stagger work hours to decrease traffic volume in the peak travel hours. While not an important element in the near future, as Holly Springs continues to grow, peak spreading can increase the carrying capacity of the available facilities.

- A program to assure proper timing and phasing of all traffic signals. Proper signal progression can have significant positive impact on a corridor, this is especially true for the NC 55 and Holly Springs corridors.

- Protection of access control is one of the areas where a significant contribution can be made. Specific corridors, such as Holly Springs Road, and all other major thoroughfares, should be protected from unrestricted access. Control of access on NC 55 Bypass is **critical.**

- A single unprotected left turning car can expend the capacity equivalent of five through vehicles. The cross-section recommendations presume that left turns at key intersections are provided for.

VI. IMPLEMENTATION

Responsibility for the implementation of the Plan must be shared by Holly Springs and the NCDOT. In order for the plan to be effective, the Town, County and the State must procure in advance or protect by various legal controls the right-of-ways necessary for the improvements which will ultimately be required. This chapter provides information to assist the local officials in prioritizing projects, and well as information concerning various implementation controls which they can use.

General

Chapter 136, Article 3A, Section 136-66.2 of the General Statutes of North Carolina provides that after development of a thoroughfare plan, the plan may be adopted by the governing body of the municipality and the Board of Transportation to serve as the basis for future street and highway improvements. The General Statutes also require that, as part of the plan, the governing body of the municipality and Department of Transportation shall reach agreement on responsibilities for existing and proposed streets and highways included in the plan. Facilities which are designated a State responsibility will be constructed and maintained by the Division of Highways. Facilities which are designated a municipal responsibility will be constructed and maintained by the municipality.

After mutual plan adoption, the Department of Transportation will initiate negotiations leading to determination of which existing and proposed thoroughfares will be a Departmental responsibility and which will be a municipal responsibility. Chapter 136, Article 3A, Section 136-66.1 of the Federal Statutes provides guidance in the delineation of responsibilities. This statute stipulates that the Department of Transportation shall be responsible for those facilities which serve volumes of through traffic and traffic from outside the area to major business, industrial, governmental, and institutional destinations located inside the municipality. The municipality is responsible for those facilities which serve primarily internal travel.

Many considerations go into determining the actual staging of a highway project. Political, social, environmental, and economic considerations all have their influence. The adoption of the Thoroughfare Plan by the Town, State and TAC does not include the order of priorities. Priorities are reviewed and set by the Town and MPO yearly, with respect given to previously agreed upon schedules. User benefits, cost, economic and environmental impacts provide a basis for rating the relative importance of proposed projects. Table 6.1 should be used to assist the decision makers - the Holly Springs Town Council, Wake County Commissioners, and the North Carolina Board of Transportation.

Construction Priorities

Table 6.1 provides an alphabetical listing of priority groupings of the recommended highway projects, and the estimated cost in 1995 dollars of each project. The list is divided into three priority groups indicating the degree of importance associated with each proposal from the technical perspective.

Priority Group 1 consists of all projects listed in the 1996-2002 edition of North Carolina's Transportation Improvement Program (TIP). Priority Group 2 improvements

are centered around alleviating current traffic deficiencies and strengthening the existing highway system. Priority Group 2 includes widening thoroughfares within the Holly Springs area and construction of new corridors. Strong enforcement of subdivision and zoning ordinances will enhance the implementation of these projects.

Priority Group 3 projects are needed in the future to provide for anticipated growth. As many of these projects will not be implemented in the near future, continued protection of the corridors is critical. Strong enforcement of local ordinances, particularly set-back and right-of-way reservation requirements, will enhance the implementation of these projects, by ensuring there will be a corridor to locate the facility.

Explanation of Items in Table 6.1

Priority Group - There are three Priority Groups, as explained above. Priority Group 3 includes all additional elements listed in the Street Tabulation (Appendix B), and not listed in Table 6.1. Project types found in this Group include minor widening, and projects which have merit but are not critical within the planning period.

Length - The length of the project, in meters (miles).

Proposed X-Section - This is a shortened term for "Proposed Cross-Section". For additional information, see Appendix B.

Prop. Access Control - "Proposed Access Control". "Full" denotes access with public streets only (spaced a minimum of 600 to1000 feet), with no private property driveways. "Partial" indicates access at a limited number of points, which can be implemented through local subdivision ordinances by requiring private lots to be served by the development's internal street network. Facilities with partial access control can have a combination of interchanges and at-grade intersections. The notation "none" in this column indicates all lesser forms of access control, including no control at all. It is important to note, however, that some control of access should be considered for all thoroughfares.

Const. Cost (X $1,000) - The estimated construction cost, in thousands of dollars, of the project (in 1995 dollars). Note that right-of-way costs are not inluded in construction costs, and can be 50% or more of construction costs.

Probable Impacts - Probable impacts includes economic development and environmental impact. Table 6.2 is a guideline for interpreting the "Probable Impact" values in Table 6.1.

Economic Development - "A project can be successful by stimulating economic development in the immediate area of the project or by increasing the level of service of accessibility to an adjacent area. The probability of a project's success in achieving this objective is affected by the overall potential for economic growth in the urban area. . . . The estimate of probabilities is a subjective evaluation by the analyst based on his knowledge of the proposed project, urban development characteristics, and land development potential."

TABLE 6.1

RECOMMENDED PRIORITY GROUPS

CORRIDOR Section	LENGTH mile (km)	EXISTING X-SECTION	PROPOSED X-SECTION	PROP. ACCESS CONTROL	CONST. COST (X$1,000)	ROW COST (X$1,000)	PROJECT NO.
PRIORITY GROUP 1							
SOUTHERN WAKE EXPRESSWAY US 1 South to US 401 South	10.1 (16.3)	N/A	4 dv	full	100,000		R-2828
NC 55 BYPASS Loop Road to North of SWE	4.5 (7.2)	N/A	2 ln on 4 dv R/W	full	5,400	3,280	R-2541
NC 55 NC 55 Bypass to US 1	1.6 (2.6)	2 ln	5 ln	partial	3,250	740	R-2905
NC 55 SR 1108 to Loop Road	3.3 (5.3)	2 ln	5 ln	partial	4,300	1,300	R-2907
PRIORITY GROUP 2						PROBABLE IMPACTS Econom. Dev.	Environment +	Environment -
NC 55 (Main Street)								
SWE - North Loop	1.4	20' (2ln)	5 ln	partial	3,000	0.8	0.3	0.2
North Loop - Holly Springs Road	1.3	20'- 36'	5 ln	partial	2,700	0.6	0.3	0.3
Avent Ferry Road (SR 1115)								
SR 1116 - NC 55 Bypass	4.6	18' (2ln)	3 ln	partial	5,900	0.8	0.4	0.4
NC 55 Bypass - NC 55	0.8	20' (2ln)	5 ln	partial	1,700	0.6	0.4	0.5
Bass Lake Road (SR 1393)								
Holly Springs Rd - Dogwood Road	0.8	18' (2ln)	3 ln	partail	1,050	0.8	0.5	0.3
Holly Springs Road (SR 1152)								
NC 55 - Bass Lake Road	0.54	20' (2ln)	5 ln	partial	1,200	0.9	0.6	0.6
Bass Lake Road - Sunset Lake Rd	1.8	20' (2ln)	5 ln	partial	3,750	0.9	0.6	0.4
Sunset Lake - Kildaire Farm Road	0.6	20' (2ln)	5 ln	partial	1,300	0.9	0.6	0.4
Irving Parkway								
New Hill Road - current end	0.5	20' (2ln)	4 dv	partial	950	0.8	0.2	0.2
Extension	0.35	N/A	2ln of 4dv	partial	700	0.6	0.2	0.2
North Loop								
Holly Springs Road - NC 55	1.1	N/A	2ln of 4dv	full	2,150	0.9	0.6	0.3
New Hill Road								
NC 55 - Irving Parkway	1.0	18' (2ln)	5 ln	partial	2,150	0.4	0.4	0.6
Sunset Lake Road (SR 1301)								
NC 55 - Holly Springs Road	2.5	18' (2ln)	3 ln	partial	3,300	0.6	0.3	0.3
Holly Springs-Sunset Lake Bridge	0.3	20' (2ln)	5 ln	partial	650	0.7	0.3	0.3

Definitions

3 ln	Three lane roadway	2lnp	Two lane roadway plus parking lane
4 dv	Four lane divided roadway (with median)	N/A	Not applicable or not available

Environmental Impact - "Environmental factors usually considered in highway project evaluation can be separated into three major categories--(1) physical environmental considerations, (2) social and/or cultural environmental considerations, and (3) economic environmental considerations. Factors included in each of these categories are given in Table [6.3]."

PROBABILITY ESTIMATION GUIDE - TABLE 6.2	
Subjective Evaluation	Impact Probability
Excellent - very substantial	0.90
Very good - substantial	0.60
Fair - some	0.40
Poor - none	0.10

"It is desirable that the evaluation of environmental impacts be condensed to a single measure or measures easily understood by the decision maker. In the benefits matrix model the approach is to estimate the probability of a positive or negative impact for each of the environmental factors. The summations of both positive and negative probabilities are then measures of the relative environmental impact of a project.

"Information from public involvement and environmental analysis elements of urban transportation studies provide a basis for estimation of probabilities for projects. If no urban transportation studies have been made, it would be necessary to rely on other planning studies and reports, or field surveys."

ENVIRONMENTAL CONSIDERATIONS - TABLE 6.3		
Physical Environment	Social and/or Cultural Environment	Economic Environment
Air quality	Housing	Business
Water resources	Neighborhoods	Employment
Soils and geology	Noise	Economic Development
Wildlife	Education facilities	Public Utilities
Vegetation	Churches	Transportation costs
	Parks and recreation	Capital costs
	Public health and safety	Operation and maintenance costs
	National defense	
	Aesthetics	

Implementation Scenarios

Spiraling right-of-way cost has greatly reduced the ability of the State to fund highway improvements. Initiative for plan implementation will rest largely with the local

policy boards involved in the Plan's development (Holly Springs Town Council, and Wake County Commissioners).

Administrative controls and implementation tools which can aid in the implementation process are generally available to municipalities through Federal and State Legislation. They include: Subdivision Regulations; Zoning Ordinances, Official Maps, Urban Renewal, Capital Improvements Programs as well as construction. The remainder of this report will briefly review the administrative controls and implementation tools available, and indicate which of these tools could be considered in implementing the recommended proposals.

Subdivision Control - This is the most important and useful tool available to local governments. Subdivision regulations are locally adopted laws governing the process of converting land into building sites. A subdivision ordinance requires that subdividers submit to the Town a plot of the proposed subdivision. Certain standards must be met by the developer before a building permit can be issued for construction of the development.

Subdivision regulations may provide such benefits as requiring portions of major streets to be constructed in accordance with the Thoroughfare Plan, or requiring subdividers to provide for the dedication and/or reservation of rights-of-way in advance of construction. These practices reduce the overall cost of the Plan by having some costs borne by developers. Recommended Subdivision Ordinances are included in Appendix A.

Functional designs are designs of a proposed roadway which are preliminary in nature, and not to the level of detail of construction plans. They may show only the centerline of the proposed roadway, or the edge of pavement and right-of-way. A functional design should be based on engineering principals, with consideration to the topography, property lines, and a screening of environmental factors. A functional design can be very useful when applying subdivision regulations to provide for proposed facilities shown on the Thoroughfare Plan. In the absence of a functional design, local staff must be diligent in plan review to assure the concept of the Thoroughfare Plan is adhered to.

The Town is encouraged to develop their own functional designs, with review by NCDOT for major thoroughfares. They may also have a design done by a consultant, or let developers provide one on a piecemeal basis. Upon request of the local jurisdiction, NCDOT may provide functional designs for major thoroughfares in areas which are under development pressures.

Should it be desired that NCDOT provide a functional design for a specific facility, the Town Manager should make a written request to the Statewide Planning coordinator for the area. The coordinator will then work with NCDOT Roadway Design and the Town. The Town will be asked to provide mapping, information on properties and other data prior to the start of the work by NCDOT. Once the functional design is completed, it will be turned over to the Town for their implementation purposes.

Zoning - A zoning ordinance can be beneficial to thoroughfare planning in that planned locations of various land uses and planned densities of dwellings can be realized. This provides a degree of stability on which to make future traffic projections and to plan streets and highways.

Other benefits of a good zoning ordinance are: (1) the establishment of standards of development which will aid traffic operations on major thoroughfares, and (2) the

minimization of strip commercial development which creates traffic friction and increases the traffic accident potential. The zoning ordinance should be structured to control strip development along the major traffic-carrying thoroughfares.

Urban Renewal - Urban renewal plays a minor role in the transportation planning implementation process. However, under the right circumstances, renewal programs can make significant contributions. Provisions of the New Housing Act of 1974 (as amended) call for the conservation of good areas, rehabilitation of declining areas, and clearance of slum areas. In the course of renewal, it is important to coordinate with the Thoroughfare Plan to see if additional set-backs or rights-of-way are needed. Continued use of urban renewal programs to improve the transportation system is encouraged. Every effort should be made to ensure that community development and transportation plans are compatible.

Official Street Map - The roadway corridor official map (or official map) is a document adopted by the legislative body of the community, that pinpoints and preserves the location of proposed streets against encroachment. In effect, the official map serves notice on developers that the State or municipality intends to acquire certain specific property. The official map serves as a positive influence for sound development by reserving sites for public improvements in anticipation of actual need.

The NCDOT limits its use of official maps to large scale, fully access controlled facilities planned for developing areas outside of municipal jurisdictions. For projects within municipal jurisdictions, official maps should be prepared and adopted by the local government. Municipalities may adopt official maps that extend beyond its extraterritorial jurisdiction with approval from the Wake County Board of Commissioners.

It should be recognized that an official map places severe but temporary restrictions on private property. These restrictions are in the form of a prohibition, for up to three years, on the issuance of building permits or the approval of subdivisions on property lying within an official map alignment. The three year reservation period begins with the request for development approval. This authority should be used carefully and only in cases where less restrictive powers are found to be ineffective.

Requests for NCDOT to prepare and adopt an official map should be directed to the Manager of the Program and Policy Branch. For towns contemplating the adoption of an official map, there are two ways in which the Town may proceed. The first is to consider the official map statute as a stand-alone authority and use it as the basis for local adoption of an official map. Alternatively, the second approach is to adopt a local ordinance modeled after the statute, but modified to fit local circumstances and clarify the statute. Regardless of the approach taken, several procedural steps will need to be considered, such as establishing procedures for consideration of variance petitions.

Once the project has been selected and the alignment determined, maps must be prepared that are suitable for filing with the County Register of Deeds Office. The map should show the proposed alignment in sufficient detail to identify the functional design and the preliminary right-of-way boundaries. Since the purpose of the map is to show the effect on properties along the project path, the existing property boundaries should be identified. Within one year of the adoption of an official map, work must begin on an environmental study or preliminary engineering.

It is important to recognize the risks inherent in the adoption of an official map prior to completing the environmental studies. Projects to be funded using any federal funds require the unbiased evaluation of alternative alignments. This means that other alternatives will be studied and compared to the protected alignment. [1]

The above information serves as an introduction to official maps, and in no way provides the information necessary to begin development of an official map. The Program and Policy Branch of the North Carolina Department of Transportation is responsible for facilitating the adoption of Official Street Maps.

Capital Improvements Program - One of the tools which makes it easier to build a planned thoroughfare system is a capital improvements program. This is a long range plan for the spending of money on street improvements, acquisition of rights-of-way, and other capital improvements within the bounds of projected revenues. Municipal funds should be available for construction of street improvements which are a municipal responsibility, right-of-way cost sharing on facilities designated as a Division of Highways responsibility, and advance purchase of right of way where such action is required.

Historically cities and towns have depended, to a great degree, on Federal or State funding to solve their transportation problems. Chapter 136-Article 3A of the Road and Highway Laws of North Carolina outlines the responsibilities of governmental bodies regarding highway improvements. North Carolina Highway Bill 1211, passed in 1988, limits the role of municipalities to specific limits in right-of-way cost sharing. Set-back regulations, right-of-way dedications and reservations play a major role in the ultimate cost of many facilities.

Street Line Ordinance - A municipality may, through special enabling legislation, adopt an official street map which indicates both existing and proposed future street lines. No new construction or reconstruction of structures would be permitted within the designated future street lines. This would, over a period of time, reduce the cost of additional right-of-way along densely developed thoroughfares which require widening and minimize damage to adjacent properties.

Summary

The goal in preparing this report was to help decision makers focus on, and take advantage of opportunities to exercise the available tools to develop the transportation system for the Holly Springs Planning Area. No single control or tool discussed is adequate to serve the transportation implementation function in and of itself. Since transportation serves development, development decisions should consider the impact that they will have on the transportation system. Lead planning time and land acquisition often requires many years before construction can begin. The existence of a Thoroughfare Plan, and use of the tools discussed in this report will allow a timely response to development.

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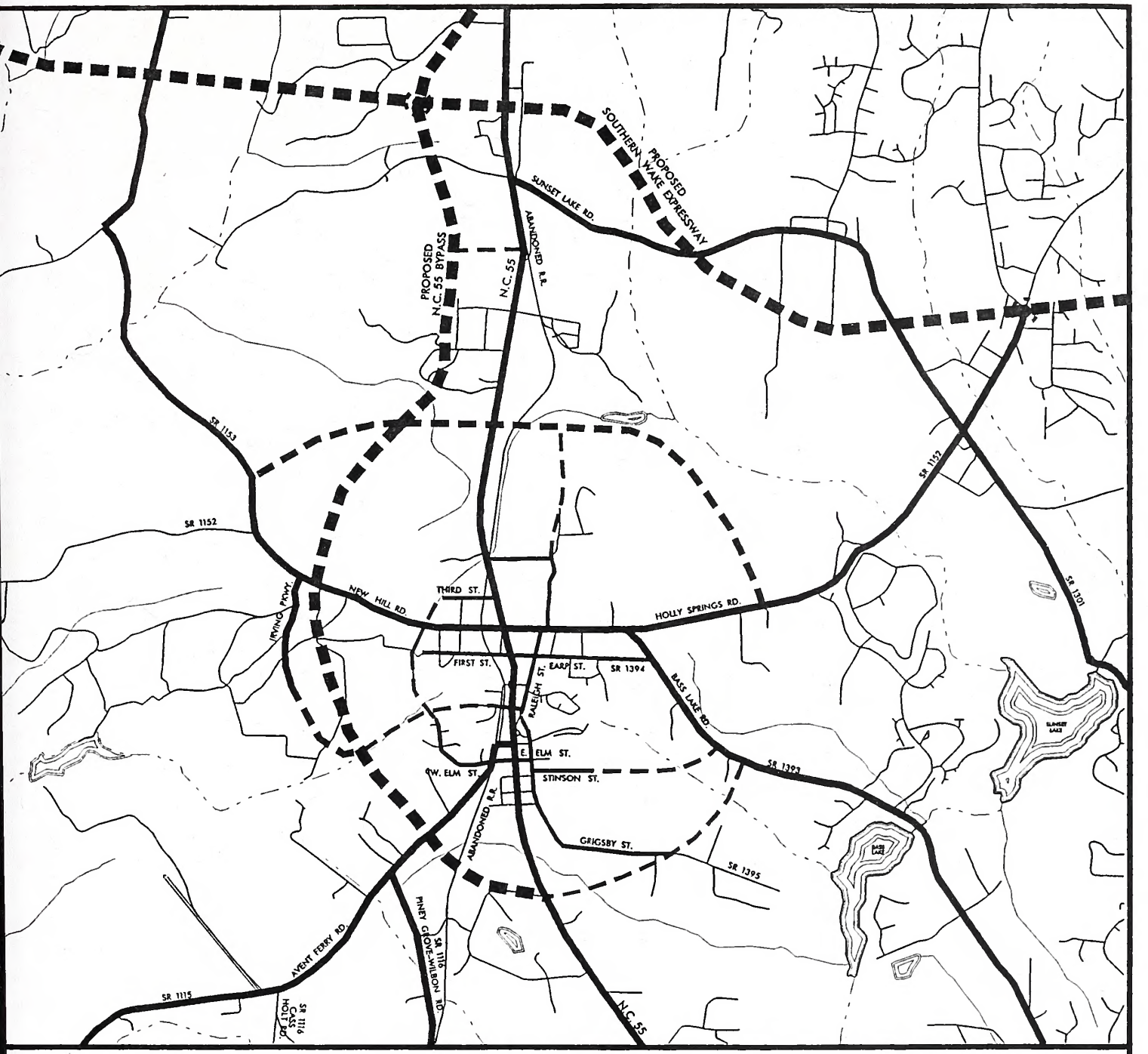
[1] "Guidelines for Municipalities Considering Adoption of Roadway Corridor Official Maps", prepared by NCDOT Program and Policy Branch. Towns considering Official Street Map projects should contact this Branch for their "Guidelines for Municipalities Considering Adoption of Roadway Corridor Official Maps" at:

Programming and Policy Branch
NC Department of Transportation
P.O. Box 25201
Raleigh, North Carolina 27611



ADOPTED BY:

HOLLY SPRINGS BOARD OF COMISSIONERS	5-18-95
TAC	5-18-95
PUBLIC HEARING	3-21-95
RECOMMENDED BY STATEWIDE PLANNING	6-20-95
N.C. DEPARTMENT OF TRANSPORTATION	7-7-95

LEGEND

	EXISTING	PROPOSED
INTERSTATE / FREEWAY	▬	▬ ▬
MAJOR THOROUGHFARE	▬	▬ ▬
MINOR THOROUGHFARE	▬	▬ ▬
INTERCHANGE	●	⊙

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THOROUGHFARE PLAN
FOR THE
TOWN OF HOLLY SPRINGS
WAKE COUNTY, NORTH CAROLINA
MAY 5, 1995

PREPARED BY
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS-ENGINEERING PLANNING BRANCH
IN COOPERATION WITH THE
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

0 1000 2000 3000 4000
SCALE IN feet

0 500 1000
SCALE IN METERS

SCALE AND DATE
OCTOBER 1994

FIGURE 5

APPENDICES

Appendix A
RECOMMENDED SUBDIVISION ORDINANCES

Note: English equivalents are printed in this report merely as a guide. The English measurements were not meant to represent exact conversions, and should not be used for standards, regulations, or construction. The tables in this section were taken from the Roadway Design Metric Design Manual. In the event of conflicting information, the Standard Specifications for Roads and Structures and the Roadway Design Metric Design Manual should serve as the standard.

RECOMMENDED SUBDIVISION ORDINANCES

DEFINITIONS

I. Streets and Roads

A. Urban Streets

1. Major Thoroughfares - Major thoroughfares consist of Interstate, other freeway, expressway, or parkway roads, and major streets that provide for the expeditious movement of high volumes of traffic within and through urban areas.

2. Minor Thoroughfares - Minor thoroughfares perform the function of collecting traffic from local access streets and carrying it to the major thoroughfare system. Minor thoroughfares may be used to supplement the major thoroughfare system by facilitating minor through traffic movements and may also serve abutting property.

3. Local Street - A local street is any street not on a higher order urban system and serves primarily to provide direct access to abutting land.

B. Specific Type of Urban Streets

1. Freeway, expressway, or parkway - Divided multilane roadways designed to carry large volumes of traffic at high speeds. A freeway provides for continuous flow of vehicles with no direct access to abutting property and with access to selected crossroads only by way of interchanges. An expressway is a facility with full or partial control of access and generally with grade separations at major intersections. A parkway is for non-commercial traffic, with full or partial control of access.

2. Residential Collector Street - A local street which serves as a connector street between local residential streets and the thoroughfare system. Residential collector streets typically collect traffic from 100 to 400 dwelling units.

3. Local Residential Street - Cul-de-sacs, loop streets less than 760 meters (2500 ft) in length, or streets less than 1.6 kilometers (1.0 miles) in length that do not connect thoroughfares, or serve major traffic generators, and do not collect traffic from more than 100 dwelling units.

4. Cul-de-sac - A short street having only one end open to traffic and the other end being permanently terminated and a vehicular turn-around provided.

5. Frontage Road - A road that is parallel to a partial or full access controlled facility and provides access to adjacent land.

6. Alley - A strip of land, owned publicly or privately, set aside primarily for vehicular service access to the back side of properties otherwise abutting on a street.

II. Property

A. Building Setback Line - A line parallel to the street in front of which no structure shall be erected.

B. Easement - A grant by the property owner for use by the public, a corporation, or person(s), of a strip of land for a specific purpose.

C. Lot - A portion of a subdivision, or any other parcel of land, which is intended as a unit for transfer of ownership or for development or both. The word "lot" includes the words "plat" and "parcel".

III. Subdivision

A. Subdivider - Any person, firm, corporation or official agent thereof, who subdivides of develops any land deemed to be a subdivision.

B. Subdivision - All divisions of a tract or parcel of land into two or more lots, building sites, or other divisions for the purpose, immediate or future, of sale or building development and all divisions of land involving the dedication of a new street or change in existing streets; provided, however, that the following shall not be included within this definition nor subject to these regulations: (1) the combination or re-combination of portions of previously platted lots where the total number of lots is not increased and the resultant lots are equal to or exceed the standards contained herein; (2) the division of land into parcels greater than 4 hectares (10 acres) where no street right-of-way dedication is involved, (3) the public acquisition, by purchase, of strips of land for the widening or the opening of streets; (4) the division of a tract in single ownership whose entire area is no greater than 0.8 hectares (2 acres) into not more than three lots, where no street right-of-way dedication is involved and where the resultant lots are equal to or exceed the standards contained herein.

C. Dedication - A gift, by the owner, of his property to another party without any consideration being given for the transfer. The dedication is made by written instrument and is completed with an acceptance.

D. Reservation - Reservation of land does not involve any transfer of property rights. It constitutes an obligation to keep property free from development for a stated period of time.

DESIGN STANDARDS

I. Streets and Roads

The design of all roads within the Planning Area shall be in accordance with the accepted policies of the North Carolina Department of Transportation, Division of Highways, as taken or modified from the American Association of State Highway Officials' (AASHTO) manuals.

The provision of street rights-of-way shall conform and meet the recommendations of the Thoroughfare Plan, as adopted by the municipality.

The proposed street layout shall be coordinated with the existing street system of the surrounding area. Normally the proposed streets should be the extension of existing streets if possible.

A. Right-of-way Widths - Right-of-way (ROW) widths shall not be less than the following and shall apply except in those cases where ROW requirements have been specifically set out in the Thoroughfare Plan.

1. Urban
   a. Major Thoroughfare other than Freeway and Expressway - 27 m (90 ft)
   b. Minor Thoroughfare - 21 m (70 ft)
   c. Local Street - 18 m[1] (60 ft)
   d. Cul-de-sac - Variable[2]

The subdivider will only be required to dedicate a maximum of 30 meters (100 ft) of right-of-way. In cases where over 30 meters (100 ft) of right-of-way is desired, the subdivider will be required only to reserve the amount in excess of 30 meters (100 ft). On all cases in which right-of-way is sought for a fully controlled access facility, the subdivider will only be required to make a reservation. It is strongly recommended that subdivisions provide access to properties from internal streets, and that direct property access to major thoroughfares, and minor thoroughfares be avoided. Direct property access to minor thoroughfares is also undesirable.

A partial width right-of-way, not less than 18 meters (60 ft) in width, may be dedicated when adjoining undeveloped property that is owned or controlled by the subdivider; provided that the width of a partial dedication be such as to permit the installation of such facilities as may be necessary to serve abutting lots. When the said adjoining property is sub-divided, the remainder of the full required right-of-way shall be dedicated.

B. Street Widths - Widths for street and road classifications other than local shall be as recommended by the Thoroughfare Plan. Width of local roads and streets shall be as follows:

1. Local Residential
   Curb and Gutter section: 7.8 meters (26 ft), face to face of curb
   Shoulder section: 6.0 meters (20 ft) to edge of pavement, 1.2 meters (4 ft) for shoulders

2. Residential Collector
   Curb and Gutter section: 10.2 meters (34 ft), face to face of curb
   Shoulder section: 6.0 meters (20 ft) to edge of pavement, 1.8 meters (6 ft) for shoulders

C. Geometric Characteristics - The standards outlined below shall apply to all subdivision streets proposed for addition to the State Highway System or Municipal Street System. In cases where a subdivision is sought adjacent to a proposed thoroughfare corridor, the requirements of dedication and reservation discussed under Right-of-Way shall apply.

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[1] The desirable minimum right-of-way (ROW) is 18 meters (60 ft). If curb and gutter is provided, 15 meters (50 ft) of ROW is adequate on local residential streets.

[2] The ROW dimension will depend on radius used for vehicular turn around. Distance from edge of pavement of turn around to ROW should not be less than distance from edge of pavement to ROW on street approaching turn around.

1. Design Speed - The design speed for a roadway should be a minimum of 10 km/h (5 mph) greater than the posted speed limit. The design speeds for subdivision type streets shall be:

DESIGN SPEEDS (METRIC)			
Facility Type	Design Speed km/h Desirable	Minimum Level	Rolling
Major Thoroughfares other than Freeway or Expressway	100	60	60
Minor Thoroughfares	100	50	50
Local Streets	50	50	30

DESIGN SPEEDS (ENGLISH)			
Facility Type	Design Speed mph Desirable	Minimum Level	Rolling
Major Thoroughfares other than Freeway or Expressway	60	50	40
Minor Thoroughfares	40	30	30
Local Streets	30	**30	**20

* Based on ADT of 400-750. Where roads serve a limited area and small number of units, can reduce min design speed.

**Based on projected ADT of 50-250.
(Reference NCDOT Roadway Design Manual page 1-1B)

2. Maximum and Minimum Grades

a. The maximum grades in percent shall be:

MAXIMUM VERTICAL GRADE					
Facility Type	Design Speed (km/h)	Design Speed (mph)	Maximum Grade (Percent) Flat	Rolling	Mountain
Major Thoroughfares other than Freeway or Expressway	50	30	8	9	11
	65	40	7	8	10
	80	50	6	7	9
	100	60	5	6	8
Minor Thoroughfares*	30	20	9	12	14
	50	30	9	11	12
	65	40	9	10	12
	80	50	7	8	10
	100	60	6	7	9
	110	70	5	6	7
Local Streets*	30	20	-	11	16
	50	30	7	10	14
	65	40	7	9	12
	80	50	6	8	10
	100	60	5	6	-

* For streets and roads with projected annual average daily traffic less than 250 or short grades less than 150 meters (500 ft) long, grades may be 2% steeper than the values in the above table. (Ref. NCDOT Roadway Metric Design Manual page 1-12 T-3)

b. Minimum grade should not be less than 0.5% .

c. Grades for 30 meters (100 ft) each way from intersections (measured from edge of pavement) should not exceed 5%.

3. Minimum Sight Distance - In the interest of public safety, no less than the minimum sight distance applicable shall be provided. Vertical curves that connect each change in grade shall be provided and calculated using the following parameters:

SIGHT DISTANCE (METRIC)					
Design Speed (km/h)	30	50	60	90	100
Stopping Sight Distance					
Minimum (meters)	29.6	57.4	74.3	131.2	157.0
Desirable (meters)	30	70	90	170	210
Minimum K* Value for:					
Crest curve	3	9	14	43	62
Sag curve	4	11	15	30	37
Passing Sight Distance:					
Minimum Passing Dist for two lanes, in m	*	*	*	*	*

* Currently under revision.
General practice calls for vertical curves to be multiples of 10 m. Calculated lengths shall be rounded up in each case. Ref. NCDOT Roadway Metric Design Manual page 1-12 T-1.

SIGHT DISTANCE (ENGLISH)				
Design Speed, MPH	30	40	50	60
Stopping Sight Distance:				
Minimum (ft.)	200	275	400	525
Desirable (ft.)	200	325	475	650
Minimum K* Value for:				
Crest Curve	30	60	110	190
Sag Curve	40	60	90	120
Passing Sight Distance:				
Minimum Passing Distance for 2 lanes, in feet	1,100	1,500	1,800	2,100

General practice calls for vertical curves to be multiples of 50 feet. Calculated lengths shall be rounded up in each case. Reference NCDOT Roadway Design Manual page 1-12 T-1.

* K is a coefficient by which the algebraic difference in grade may be multiplied to determine the length of the vertical curve which will provide the desired sight distance. Sight distance provided for stopped vehicles at intersections should be in accordance with "A Policy on Geometric Design of Highways and Streets, 1990".

4. The "Superelevation Table" shown below shows the minimum radius and the related maximum superelevation for design speeds. The maximum rate of roadway superelevation (e) for rural roads with no curb and gutter is 0.08. The maximum rate of superelevation for urban streets with curb and gutter is 0.06, with 0.04 being desirable.

SUPERELEVATION TABLE (METRIC)		
Design Speed	Maximum e*	Minimum Radius m
50 km/h	0.04	100
65	0.04	175
80	0.04	280
100	0.04	490
50	0.06	90
65	0.06	160
80	0.06	250
100	0.06	435
50	0.08	80
65	0.08	145
80	0.08	230
100	0.08	395

e = rate of roadway superelevation, meter per meter

SUPERELEVATION TABLE (ENGLISH)			
Design Speed	Maximum e*	Minimum Radius ft.	Max. Deg. of Curve
30 mph	0.04	302	19 00′
40	0.04	573	10 00′
50	0.04	955	6 00′
60	0.04	1,637	3 45′
30	0.06	273	21 00′
40	0.06	521	11 15′
50	0.06	955	6 45
60	0.06	1,432	4 15′
30	0.08	260	22 45′
40	0.08	477	12 15′
50	0.08	819	7 30′
60	0.08	1,146	4 45′

* e = rate of roadway superelevation, foot per foot. Reference NCDOT Roadway Design Manual page 1-12 T-6 thru T-8.

D. Intersections

1. Streets shall be laid out so as to intersect as nearly as possible at right angles, and no street should intersect any other street at an angle less than sixty-five (65) degrees.

2. Property lines at intersections should be set so that the distance from the edge of pavement,

of the street turnout, to the property line will be at least as great as the distance from the edge of pavement to the property line along the intersecting streets. This property line can be established as a radius or as a sight triangle. Greater offsets from the edge of pavement to the property lines will be required, if necessary, to provide sight distance for the stopped vehicle on the side street.

3. Off-set intersections are to be avoided. Intersections which cannot be aligned should be separated by a minimum length of 60 meters (200 ft) between survey center lines.

E. Cul-de-sacs

Cul-de-sacs shall not be more than 150 meters (500 ft) in length. The distance from the edge of pavement on the vehicular turn around to the right-of-way line should not be less than the distance from the edge of pavement to right-of-way line on the street approaching the turn around. Cul-de-sacs should not be used to avoid connection with an existing street or to avoid the extension of an important street.

F. Alleys

1. Alleys shall be required to serve only lots used for commercial and industrial purposes except that this requirement may be waived where other definite and assured provisions are made for service access.

2. The width of an alley shall be at least 6.0 meters (20 ft).

3. Dead end alleys shall be avoided where possible, but if unavoidable, shall be provided with adequate turn around facilities at the dead end as may be required by the Planning Board.

G. Permits For Connection To State Roads

An approved permit is required for connection to any existing state system road. This permit is required prior to any con-struction on the street or road. The application is available at the office of the District Engineer of the Division of Highways.

H. Offsets To Utility Poles

Poles for overhead utilities should be located clear of roadway shoulders, preferably a minimum of at least 9.0 meters (30 ft) from the edge of pavement. On streets with curb and gutter, utility poles shall be set back a minimum distance of 1.8 meters (6 ft) from the face of curb.

I. Wheel Chair Ramps

All street curbs being constructed or reconstructed for maintenance purposes, traffic operations, repairs, correction of utilities, or altered for any reason, shall provide wheelchair ramps for the physically handicapped at intersections where both curb and gutter and sidewalks are provided and at other major points of pedestrian flow.

J. Horizontal Width on Bridge Deck

1. The clear roadway widths for new and reconstructed bridges serving 2 lane, 2 way traffic should be as follows:

   a. Shoulder section approach

      i. Under 800 ADT design year - Minimum 8.4 meters (28 ft) width face to face of parapets, rails, or pavement width plus 3.0 meters (10 ft), whichever is greater.

      ii. 800 - 2000 ADT design year - Minimum 10.2 meters (34 ft) width face to face of parapets, rails, or pavement width plus 3.6 meters (12 ft), whichever is greater.

      iii. Over 2000 ADT design year - Minimum width of 12 meters (40 ft), desirable width of 13.2 meters (44 ft) width face to face of parapets or rails.

   b. Curb and gutter approach

      i. Under 800 ADT design year - Minimum 7.2 meters (24 ft) face to face of curbs.

      ii. Over 800 ADT design year - Width of approach pavement measured face to face of curbs.

      Where curb and gutter sections are used on roadway approaches, curbs on bridges shall match the curbs on approaches in height, in width of face to face of curbs, and in crown drop. The distance from face of curb to face of parapet or rail shall be a minimum of 450 millimeters (1' 6"), or greater if sidewalks are required.

2. The clear roadway widths for new and reconstructed bridges having 4 or more lanes serving undivided two-way traffic should be as follows:

   a. Shoulder section approach - Width of approach pavement plus width of usable shoulders on the approach left and right. (Shoulder width 2.4 m (8 ft) minimum, 3.0 m (10 ft) desirable.)

   b. Curb and gutter approach - Width of approach pavement measured face to face of curbs.

Appendix B
STREET INVENTORY

The Street Inventory consists of an alphabetized street listing, with base year and future year traffic, and the recommended cross section for each street. The recommendations are minimums, and may be exceeded at the discretion of the local community, particularly when local sidewalk standards are to be met. Due to the high growth potential of Holly Springs well beyond the design year, the recommended cross sections consider spacing and growth beyond that indicated by the traffic forecasts.

This inventory was coordinated with the NC 55 Bypass E.A., and the Wake County and Greater Raleigh Thoroughfare Plan reports.

STREET INVENTORY

Definitions

Practical Capacity: Capacity at Level of Service D (based in part on the 1985 Highway Capacity Manual)

1993 ADT: Average daily traffic in 1993

2015 ADT: Average daily traffic projected for 2015

3 ln Three lane roadway

4 dv Four lane divided roadway

2 lnp Two lane roadway plus parking lane(s)

5*ln Five lane roadway with wide outside lanes

adeq Adequate

N/A Not applicable

90 ULT Special R/W to provide for a larger future ultimate cross section.

\- Information not available

4 dvS Four lane divided roadway, staged construction. (Initially two lanes on multi-lane right-of-way.)

<5,000 As a two lane roadway capacity exceeds 5,000 vpd, facilities with 2015 year traffic volumes below 5000 vehicles per day, are simply noted in the listing as "<5,000."

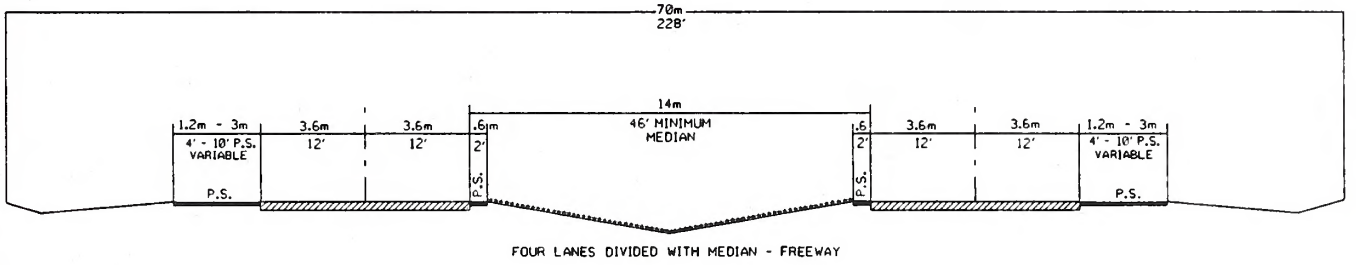
Street - Section Reference	LENGTH (mi.)	EXISTING ROADWAY (ft)	EXIST. ROW	1993 PRACT. CAPACITY	1993 ADT	2015 ADT	RECOMMENDED CROSS-SECTION Roadway	R/W
MAJOR THOROUGHFARES								
NC 55 (Main Street)								
SWE - North Loop	1.4	20 (2 ln)	-	9,000	13,000	10,200	C (5 ln)	90
North Loop - Holly Springs Road	0.9	20 (2 ln)	-	9,000	13,000	8,000	C (5 ln)	70
Holly Springs Rd - Ballentine	0.4	36 (3 ln)	-	14,000	9,200	9,500	H (3 ln)	70
Ballentine Road - south NC 55 Byp	1.0	20 (2 ln)	-	9,000	9,200	9,000	H (3 ln)	70
south NC 55 Byp-end planning area	0.6	20 (2 ln)	-	9,000	7,900	21,000	C (5 ln)	90
NC 55 Bypass								
SWE - NC 55 north	4.4	N/A	N/A	N/A	N/A	17,000	F (4dvS)	200
Avent Ferry Road (SR 1115)								
SR 1116 - NC 55 Bypass	1.1	18 (2 ln)	60	9,000	2,100	8,800	N (5*ln)	90
NC 55 Bypass - NC 55	0.6	18 (2 ln)	60	9,000	900	2,000	H (3*ln)	90
Bass Lake Road (SR 1393)								
Holly Springs Road - Dogwood Road	0.8	18 (2 ln)	60	8,000	1,700	5,000	H (3 ln)	90 ULT
Holly Springs Road (SR 1152)								
NC 55 - Bass Lake Road	0.54	20 (2 ln)	60	9,000	2,500	7,800	N (5*ln)	90
Bass Lake Road - Sunset Lake Rd	1.8	20 (2 ln)	60	9,000	2 700	11,500	N (5*ln)	90
Sunset Lake Rd - Kildaire Farm	0.6	20 (2 ln)	60	9,000	5,300	13,500	N (5*ln)	90
see New Hill Road for continuation of SR 1152								
Irving Parkway								
New Hill Road - end	0.5	20 (2 ln)	100	10,000	-	<5,000	F (4dvS)	100
end - NC 55 Bypass	0.35	N/A	-	10,000	N/A	<5,000	F (4dvS)	100
New Hill Road (SE 1152)								
NC 55 - Irving Parkway	1.0	18 (2 ln)	60	8,500	1,900	7,000	C (5 ln)	90
Irving Parkway - North Loop	0.6	18 (2 ln)	60	8,500	300	<5,000	H (3 ln)	60
North Loop (proposed facility)								
New Hill Road - NC 55	1.7	N/A	N/A	N/A	N/A	5,000	F (4dvS)	100
NC 55 - Holly Springs Road	1.1	N/A	N/A	N/A	N/A	5,000	F (4dvS)	100

Street - . Section Reference	LENGTH (mi.)	EXISTING ROADWAY (ft)	EXIST. ROW	PRACT. CAPACITY	1993 ADT	2015 ADT	RECOMMENDED CROSS-SECTION	
		MAJOR THOROUGHFARES						
							ROADWAY	ROW
Piney Grove - Wilbon Road (SR 1101)								
Avent Ferry Rd - end planning area	0.8	20 (2 ln)	60	9,000	2,900	5,700	G (4 ln)	70
Southern Wake Expressway - SWE (proposed facility)								
US 1 - Holly Springs Road	-	N/A	N/A	N/A	N/A	46,000	A (4 dv)	300
Sunset Lake Road (SR 1301)								
NC 55 - Holly Springs Road	2.5	20 (2 ln)	60	10,000	1,800	8,200	H (3ln)	90 ULT
Holly Sp. Rd - Sunset Lake Bridge	0.3	18 (2 ln)	60	9,000	4,500	11,300	N (5*ln)	90
		MINOR THOROUGHFARES					ROADWAY	ROW
Ballentine Street								
Raleigh Street - Avent Ferry Road	0.1	18 (2 ln)	-	8,000	-	8,000	G (4 ln)	70
Avent Ferry Road - Irving Parkwy	0.8	N/A	N/A	N/A	N/A	<5,000	H (3 ln)	60
Burt Street								
New Hill Road - Ballentine Ext.	0.1	18 (2 ln)	-	7,000	-	<5,000	H (3 ln)	60
Cayman Avenue								
Holly Springs Road - end	0.3	22 (2 ln)	-	11,000	-	<5,000	H (3 ln)	60
end - North Loop	0.6	N/A	N/A	N/A	N/A	<5,000	H (3 ln)	60
Earp Street								
NC 55 - Bass Lake Road	0.6	18 (2 ln)	60	8,000	450	<5,000	H (3 ln)	60
Elm Street								
Grigsby St - Avent Ferry Road	0.2	16 (2 ln)	-	7,000	-	<5,000	H (3 ln)	60
Avent Ferry Road - Hollyberry Ln	0.4	24 (2 ln)	-	11,000	-	<5,000	K (2 ln)	70

Street - Section Reference	LENGTH (mi.)	EXISTING ROADWAY (ft)	EXIST. ROW	PRACT. CAPACITY	1993 ADT	2015 ADT	RECOMMENDED CROSS-SECTION ROADWAY	ROW
MINOR THOROUGHFARES								
First Street								
NC 55 - Burt Street	0.3	18 (2 ln)	-	8,000	-	<5,000	H (3 ln)	60
Burt Street - Robertson Street	0.1	N/A	N/A	N/A	N/A	<5,000	H (3 ln)	60
Grisgsby Street								
Raleigh St - Stinson Street	0.3	18 (2 ln)	-	7,000	300	5,500	H (3 ln)	70
Stinson St - South Loop Connector	0.8	18 (2 ln)	-	7,000	300	<5,000	K (2 ln)	70
Raleigh Street								
Holly Springs Road - Grigsby St	0.4	18 (2 ln)	-	9,000	-	7,000	K (2 ln)	70 ULT
Stinson Street								
Grigsby Street - end	0.2	18 (2 ln)	-	9,000	-	<5,000	H (3 ln)	70
end - Bass Lake Road	0.7	N/A	N/A	N/A	N/A	<5,000	H (3 ln)	70
South Loop Connector								
55 - Bass Lake Road	1.2	N/A	N/A	N/A	N/A	7,000	H (3 ln)	70
Third Street								
NC 55 - New Hill Road	0.4	18 (2 ln)	-	9,000	-	<5,000	K (2 ln)	70

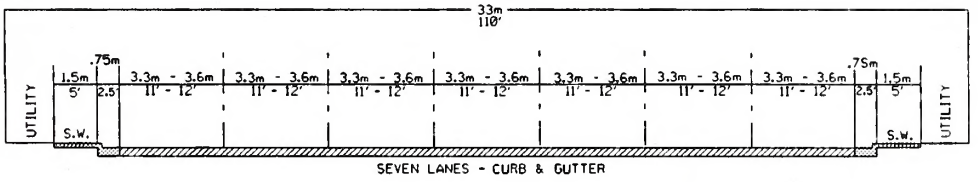
TYPICAL THOROUGHFARE CROSS SECTIONS

A.



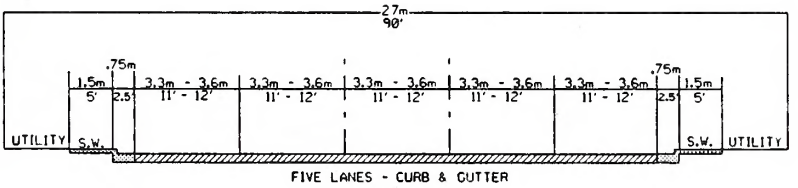
FOUR LANES DIVIDED WITH MEDIAN - FREEWAY

B.



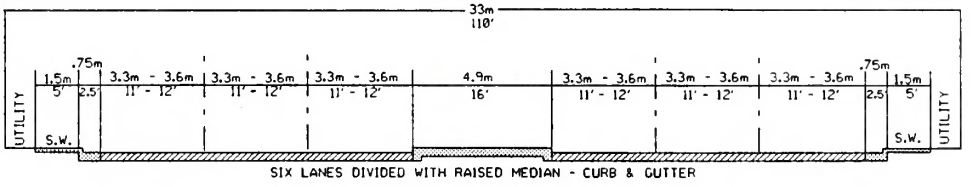
SEVEN LANES - CURB & GUTTER

C.



FIVE LANES - CURB & GUTTER

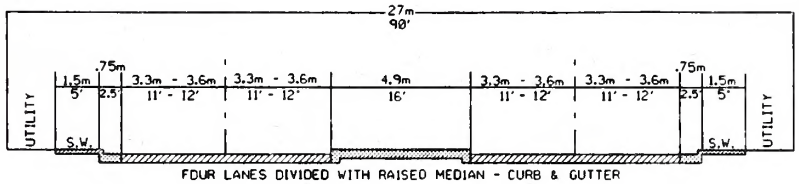
D.



SIX LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

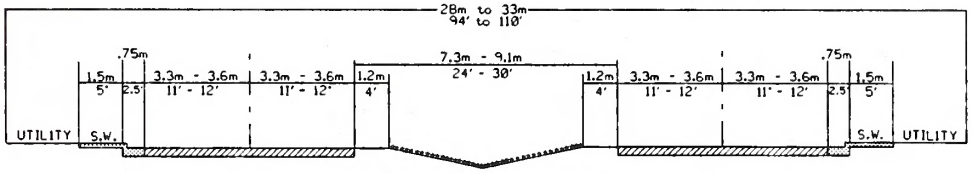
TYPICAL THOROUGHFARE CROSS SECTIONS

E.



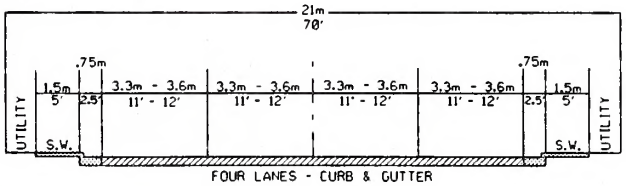
FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

F.



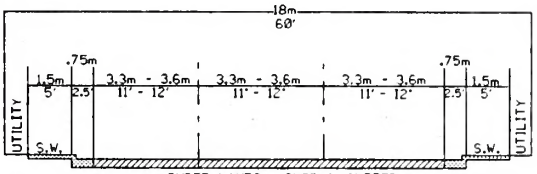
FOUR LANES DIVIDED - BOULEVARD
GRASS MEDIAN

G.



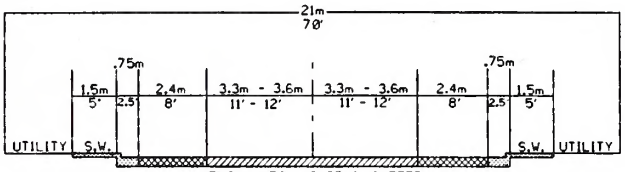
FOUR LANES - CURB & GUTTER

H.



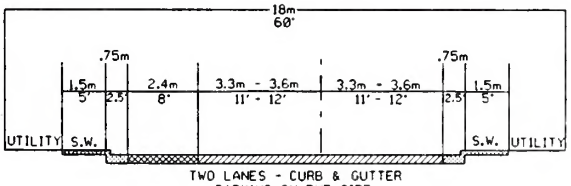
THREE LANES - CURB & GUTTER

I.



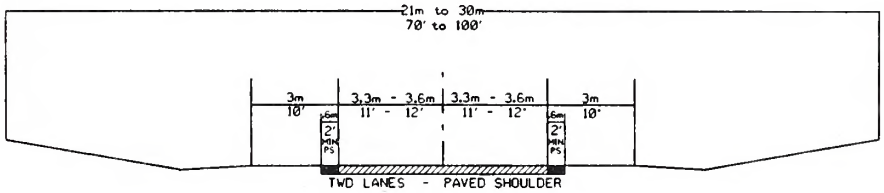
TWO LANES - CURB & GUTTER
PARKING ON EACH SIDE

J.



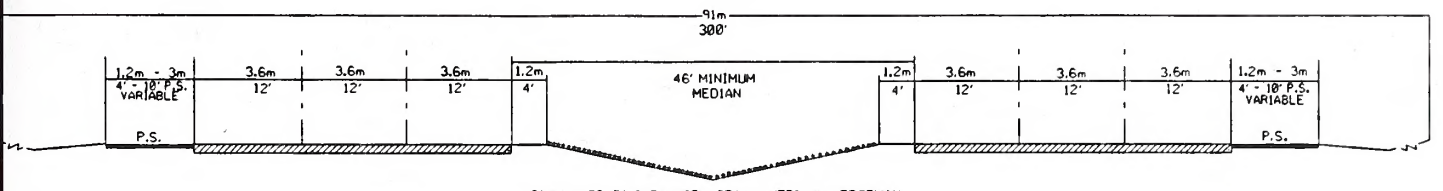
TWO LANES - CURB & GUTTER
PARKING ON ONE SIDE

K.



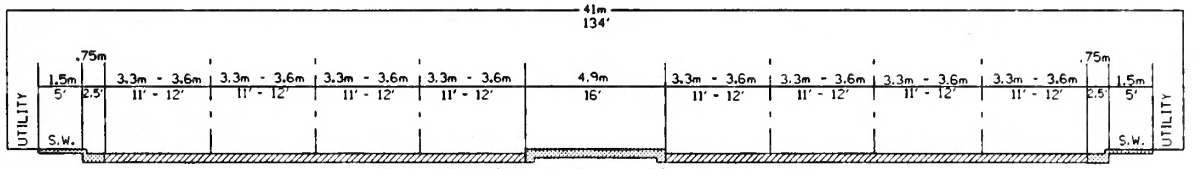
TWO LANES - PAVED SHOULDER

TYPICAL THOROUGHFARE CROSS SECTIONS



SIX LANES DIVIDED WITH GRASS MEDIAN - FREEWAY

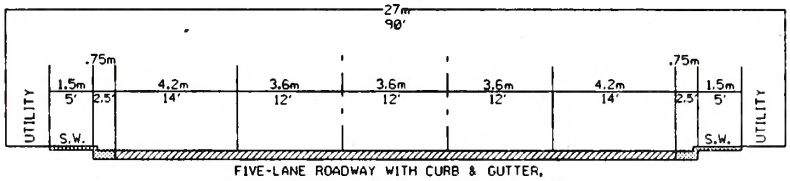
M.



EIGHT LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER

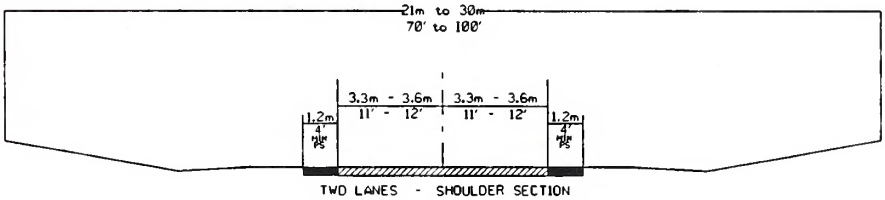
TYPICAL THOROUGHFARE CROSS SECTIONS FOR ACCOMMODATING BICYCLES

N.



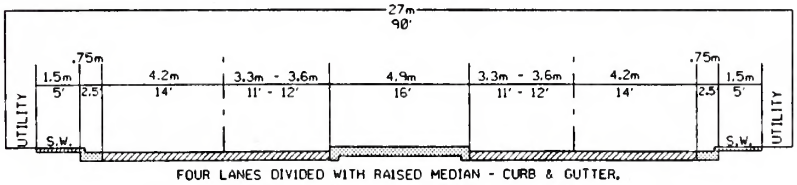
FIVE-LANE ROADWAY WITH CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

O.



TWO LANES - SHOULDER SECTION

P.



FOUR LANES DIVIDED WITH RAISED MEDIAN - CURB & GUTTER,
STANDARD INSIDE LANES & WIDENED CURB LANES

Appendix C

NCDOT PEDESTRIAN AND BICYCLE POLICIES

PEDESTRIAN POLICY GUIDELINES
4-20-94

INTRODUCTION

These guidelines provide a procedure for implementing the Pedestrian Policy adopted by the Board of Transportation in August 1993. The Pedestrian Policy addresses TIP projects and makes an important distinction between "considering the needs of pedestrians to avoid creating hazards to pedestrian movements" and the concept of "facilitating pedestrian movements for other reasons." Consequently, these guidelines are divided into three main sections:

1) Considering the needs of pedestrians to avoid creating hazards.
2) Quantifying the need for pedestrian facilities.
3) Requirements for DOT funding.

CONSIDERING THE NEEDS OF PEDESTRIANS TO AVOID CREATING HAZARDS

Section "d" of the Pedestrian Policy states: *"In the planning, design, and construction of TIP transportation projects, the DOT shall consider the needs of pedestrians and will not create hazards to pedestrian movements."* This means that during each phase of a project, a DOT employee should consider how the project will affect pedestrian movements. If the project will create a hazard to pedestrian movement, the DOT should use engineering judgement and find a way to remove the hazard. A hazard in this context is defined as a situation when pedestrian movements are physically blocked in a manner which forces pedestrians to use another mode of transportation, or walk in an automobile traffic lane (parallel with the automobile traffic) to pass a barrier.

This does not mean that the DOT should build pedestrian facilities on all TIP projects. However, it does mean that the DOT should consider how projects will affect pedestrians and how projects can be designed to accommodate vehicular demands without creating barriers to pedestrians. Hazards can be divided into two categories, lateral barriers and perpendicular barriers. Lateral barriers prevent pedestrians from traveling parallel to the roadway. Perpendicular barriers prevent pedestrians from crossing a roadway.

The concept of "not creating a hazard" is intended to allow municipalities to have the flexibility to add pedestrian facilities as part of the project or in the future after the TIP project is complete. Because bridges are so expensive and because they often have useful lives over fifty years, bridges should be given special consideration when pedestrian travel is anticipated.

BRIDGES

Current standard cross sections generally do not create barriers for pedestrian movements. One exception is on urban bridges where the bridge rail is at the back of the curb. A bridge which has barrier rail or support columns at the back of the curb and gutter is a lateral barrier. On rural bridges, a minimum shoulder may be sufficient to "not create a hazard for pedestrian movements" over or under the bridge.

SHOULDER CROSS SECTIONS

Currently, there is no typical cross section for a rural road with a shoulder, and a pedestrian facility which is outside of the ditch. However, when a rural road with a shoulder section has a pedestrian facility outside of the ditch, the ditch will not be considered a perpendicular barrier. Similarly, as long as there is some space where pedestrians can walk which is not in an automobile travel lane, the ditch will not be considered a lateral barrier either.

WIDENING PROJECTS

If a TIP project widens a road from 2 lanes to 5 lanes, the new 5-lane road is not considered a perpendicular barrier. Similarly, as long as there is some space where pedestrians can walk which is not in an automobile travel lane, the new 5-lane road is not considered a lateral barrier either.

RELOCATING PEDESTRIAN MOVEMENTS

This policy is not intended to require a pedestrian bridge or tunnel at interchanges where sidewalks and crosswalks are not practical. In these cases, the DOT may consider relocating the pedestrian movement to avoid creating unsafe situations or making unpractical design modifications. Typically, relocated pedestrian movements should be no more than 800 meters (0.5 miles) away from the original path of the pedestrians. The 800 meter distance is a one way distance, not a round trip distance.

CONSTRUCTION PROCESS

During the construction phase of a project, there may be times when it is not possible to maintain all pedestrian movements through the entire construction process. When necessary, there may be temporary barriers to pedestrian movements in the work zone.

EXAMPLE

For example, the "XYZ" Expressway is a new controlled-access freeway through an established urban area. A major thoroughfare with sidewalks which will have a new interchange with the Expressway, connects a neighborhood on the north side of the Expressway with a hospital on the south side of the Expressway. Because the proposed interchange for the major thoroughfare is a Single-Point-Diamond design with free-flowing ramps in all four quadrants, there is no safe way for a pedestrian to cross the Expressway with out conflicting with free-flowing traffic. Although there is a nearby railroad bridge over the Expressway, pedestrians are prohibited from that bridge because it was not designed to accommodate both trains and pedestrians. Consequently, residents who live in a neighborhood a few blocks from the hospital will now need to drive to the hospital or walk through a free-flowing traffic lane.

Using this example with the new pedestrian policy in effect, the design engineer should make every reasonable effort to design this interchange to accommodate the automobile traffic, and not create a barrier for pedestrian movements. If the interchange design requires free-flow ramps as this Single-Point-Diamond design does, the engineer should determine if it is possible for pedestrians to cross the free-flow traffic lanes. If the peak hour traffic flow has acceptable gaps to allow pedestrians to cross safely, the ramps will not be considered a barrier. However, if traffic volumes or pedestrian volumes are too great, an alternative pedestrian facility should be considered. If accommodating pedestrians at the interchange will compromise safety or good engineering judgement, the engineer should consider if shifting the pedestrian movement away from the interchange is a feasible alternative. Since there is a nearby railroad bridge over the Expressway, maybe the railroad bridge could be designed to handle pedestrian movements too.

QUANTIFYING THE NEED FOR PEDESTRIAN FACILITIES

Section "e" of the Pedestrian Policy states: *"The Department recognizes there are certain situations in which pedestrian facilities provide significant benefits in the movement of pedestrian traffic..."* If a municipality would like the DOT to consider a project for "significant benefits," the municipality is responsible for collecting any necessary information and submitting a written request prior to the initiation of a planning study. The DOT will review the request and, if necessary, verify the data from the municipality. If pedestrian facilities are not incorporated into a project during the planning phase, and if there are

significant factors which change during the time between the project planning study and the project design phase, municipalities may resubmit a request for pedestrian facilities prior to the closure of comment period for the Design Public Hearing.

Planning studies should evaluate the need for pedestrian facilities based on the degree to which the following seven criteria are met. Municipalities should address each of these criteria when submitting requests for pedestrian facilities. Subsequently, the DOT will make the final determination for pedestrian facility eligibility.

1. **Local Pedestrian Policy.** There is evidence that local policies on urban development are encouraging urban densities and residential developments to occur in a manner to facilitate pedestrian travel by reducing walking distances, and requiring sidewalk construction in development ordinances.
   * Is a pedestrian plan included in local thoroughfare plan?
   * Do subdivision ordinances require pedestrian facility construction?
   * Do local zoning ordinances facilitate pedestrian travel? (For example, do the zoning ordinances encourage mixed-use developments which are accessible to pedestrians or do the zoning ordinances encourage highway strip development which is not accessible to pedestrians?)

2. **Local Government or Local Sponsor Commitment.** There is a local government/sponsor plan and commitment to provide an integrated system of pedestrian facilities which will connect with pedestrian facilities provided by the project.
   * Does the local Capital Improvement Program include local funds for providing pedestrian facilities which will connect with pedestrian facilities provided by the NC TIP project?
   * How many pedestrian facilities currently connect with the pedestrian facilities provided by the project?
   * How many subdivisions have provided pedestrian facilities which are or will be connected with pedestrian facilities provided by the project?
   * Has a responsible local government agency agreed in writing to maintain the pedestrian facility?

3. **Continuity and Integration.** The project provides a connection to an existing or a proposed pedestrian network and will provide a critical link in the network.
   * Is the project a critical link in an existing network? (For example, will this project provide a missing link in an existing network where there are pedestrian facilities extending beyond the length of this project?)

* Is the project a critical link in a proposed network? (For example, will this project provide any link in a proposed network where there will be pedestrian facilities extending beyond the length of this project?)

4. **Location.** The project is located within a Census defined urban area or growth area where development is anticipated in the immediate future; a majority of the properties within walking distance of the project are developed, or projected to be developed within 5 years at urban type residential densities. This five year period will begin at the completion of the appropriate environmental document.
   * Is the project located in a Census defined urban area?
   * Is the project located in a growth area (Urbanized Area Boundary) where development is anticipated in the immediate future, but is not in a Census defined urban area?
   * Are a majority of the properties within walking distance of the project developed, or projected to be developed within 5 years at urban type residential densities (a minimum of 1 dwelling unit per acre)?

5. **Generators.** The project serves as a primary access from one or more of the following to one another:
   - day care, elementary or secondary school
   - college or university
   - community facility (such as library or park)
   - public transportation
   - commercial, office, industry, or business centers
   - residential areas

   * Will any of these land-uses within two kilometers (1.2 miles) of the project use this project as a primary access?

6. **Safety.** The project provides demonstrable safety benefits for pedestrians.
   * Will the pedestrian facility separate pedestrians from automobile traffic with a posted speed greater than 80 kilometers per hour (50 miles per hour)?
   * Will the pedestrian facility be used by children (0-14), elderly (65+), handicapped, or low-income people?
   * Will the pedestrian facility reduce potential pedestrian-vehicle conflicts?
   * Will the pedestrian facility address the identified safety needs of the area?

7. **Existing or Projected Traffic.** Continued, sustained pedestrian travel can be shown by any of the following:
   - Evidence of existing usage such as well worn paths.
   - Projected usage based on previous experience with similar facilities.
   - Minimum of 150 pedestrians per 24 hour period along a corridor planned for the project.

REQUIREMENTS FOR DOT FUNDING

REPLACING EXISTING SIDEWALKS

Section "b" of the Pedestrian Policy states: *"When a highway construction project having to do with the widening of an existing street requires that an existing sidewalk be torn up to make room for the widening, it is the policy of the Department of Transportation to replace the sidewalk."* This statement says the DOT will pay 100% of the cost to replace an existing sidewalk which is removed to make room for a widening project. There is no monetary cap for this category of funding pedestrian facilities.

PREVENTING HAZARDS

Section "d" of the Pedestrian Policy states: *"In the planning, design, and construction of TIP transportation projects, the DOT shall consider the needs of pedestrians and will not create hazards to pedestrian movements."* If there is evidence that a TIP project would create a hazard to existing pedestrian movements, the DOT will take the initiative to not create the hazard. However, if there is not evidence that a TIP project would create a hazard to existing pedestrian movements, the municipality will need to prove there will be pedestrian movements which will be affected within five years by the hazard created by the TIP project. The five year period will begin at the completion of the appropriate environmental document (Categorical Exclusion, Finding of No Significant Impact, or Environmental Impact Statement).

CERTAIN SITUATIONS

Section "e" of the Pedestrian Policy states: *"The Department recognizes there are certain situations in which pedestrian facilities provide significant benefits in the movement of pedestrian traffic. The Department of Transportation may participate in the provision of these facilities on a full or shared-cost basis."* This statement says the DOT may participate in funding incidental projects, and independent projects as described below.

INCIDENTAL PROJECTS

Incidental pedestrian projects are defined as TIP projects where pedestrian facilities are included as part of the project. The DOT may share the incremental cost of constructing the pedestrian facilities if the "intent of the criteria" are met, and the request for DOT participation is made prior to the closure of comment period for the Design

Public Hearing. The DOT will pay a matching share of incidental pedestrian facility total construction costs up to a cap of no more than 2% of total project construction cost. This "total project construction cost" does not include the construction cost of any incidental pedestrian facilities. The matching share is a sliding scale based on population as follows:

MUNICIPAL POPULATION	PARTICIPATION DOT	LOCAL
> 100,000	50%	50%
50,000 to 100,000	60%	40%
10,000 to 50,000	70%	30%
< 10,000	80%	20%

The local government share of the pedestrian facility construction funding may not be Federal or State money for the purposes of these guidelines. In addition, the right-of-way municipalities provide for pedestrian projects may not be counted toward the required local contribution.

INDEPENDENT PROJECTS

Independent pedestrian projects are defined as projects where pedestrian facilities are the entire project. The DOT will have a separate category of money for all independent pedestrian facility projects in North Carolina. The independent pedestrian facility funds will be administered similar to Bicycle Program. Municipalities will prioritize their requests under the enhancements section of the local request list, and the DOT will fund as many projects as funding will allow.

GENERAL INFORMATION

The attached flow chart illustrates the decision process for a project engineer. In addition, the funding caps, right-of-way and maintenance requirements described below must also be met.

FUNDING CAPS

Under normal circumstances, the cumulative funding for preventing hazards and providing incidental pedestrian facilities should not exceed 2% of the total project construction cost. This "total project construction cost" does not include the construction cost of any incidental pedestrian facilities. The 2% cap is intended as a guide, not as an absolute cap. Consequently, the appropriate Branch Manager can approve pedestrian funds over the 2% cap.

RIGHT-OF-WAY

In general, municipalities are responsible for providing any right-of-way needed to construct pedestrian facilities. The DOT will allow pedestrian facilities on DOT right-of-way only if the pedestrian facility will not compromise the safety of vehicles or pedestrians. For preventing hazards, the DOT máy buy the necessary right-of-way. For incidental and independent projects the DOT shall not pay extra right-of-way cost for pedestrian facilities.

Since the DOT's typical curb and gutter cross-section generally has a 2.4 meter (8 foot) berm, a 1.5 meter (5 foot) pedestrian facility may fit within this standard right-of-way. However, on curb and gutter sections, most municipalities want a 3 meter (10 foot) berm to put a 1.5 meter (5 foot) grassy strip and a 1.5 meter (5 foot) pedestrian facility. In this situation, the municipalities will need to provide the additional 0.6 meters (2 feet) of right-of-way.

On shoulder cross sections, the DOT typically does not have additional right-of-way behind the ditch. In addition, the DOT does not put paved pedestrian facilities between the road and the ditch. Since the DOT would not typically have the right-of-way needed for a pedestrian facility, the municipality must provide all of the additional right-of-way.

Applicable AASHTO standards for right-of-way and design must be met. The DOT will not narrow automobile travel lanes to accommodate incidental pedestrian facilities. For example, if a project specifies five 3.6 meter (12 foot) lanes on a section of road, the DOT will not reduce the width of the travel lanes to 3.0 meters (10 feet) to create room for pedestrian facilities. In addition, if right-of-way is restricted, and there is insufficient room for pedestrian facilities and a utility strip, the utility strip will take precedence.

Applicable Federal and State regulations must also be met. For example, if right-of-way for a particular project is restricted by historic property, federal regulations on historic preservation may prohibit the DOT from using additional right-of-way for pedestrian facilities.

MAINTENANCE

Local governments are responsible for maintaining all pedestrian facilities. The Municipal Agreement will formally specify that the DOT is not responsible for maintaining pedestrian facilities.

POLICY ADOPTED BY THE NC BOARD OF TRANSPORTATION

.0406 CONSTRUCTION AND MAINTENANCE OF SIDEWALKS AND OTHER PEDESTRIAN FACILITIES

(a) It is the policy of the Board of Transportation that highway funds are for the purpose of constructing and improving streets and highways for the movement of people and goods. Generally, within municipalities, the construction of a sidewalk on a state highway system street is considered a municipal responsibility.

(b) When a highway construction project having to do with the widening of an existing street requires that an existing sidewalk be torn up to make room for the widening, it is the policy of the Department of Transportation to replace the sidewalk.

(c) For construction and widening projects where sidewalks do not already exist, it is the policy of the Department of Transportation that it will not participate in the construction of sidewalks except as in subsections (d) and (e). If adequate right of way is available, the Department of Transportation will grade out a level walking area back of the curb in the utility strip. The municipality may, at its own discretion, construct sidewalks. If the municipality desires sidewalks as a part of the construction project, they will be constructed and the city will reimburse the Department of Transportation for the cost of the sidewalks by appropriate municipal agreement.

(d) In the planning, design, and construction of TIP transportation projects, the Department of Transportation shall consider the needs of pedestrians and will not create hazards to pedestrian movements.

(e) The Department recognizes there are certain situations in which pedestrian facilities provide significant benefits in the movement of pedestrian traffic. The Department of Transportation may participate in the provision of these facilities on a full or shared cost basis.

North Carolina Department of Transportation

BICYCLE POLICY

General

Pursuant to the Bicycle and Bikeways Act of 1974, the Board of Transportation finds that bicycling is a bonafide highway purpose subject to the same rights and responsibilities and eligible for the same considerations as other highway purposes, as elaborated below.

1. The Board of Transportation endorses the concept that bicycle transportation is an integral part of the comprehensive transportation system in North Carolina.

2. The Board of Transportation endorses the concept of providing bicycle transportation facilities within the rights-of-way of highways deemed appropriate by the Board.

3. The Board of Transportation will adopt "Design Guidelines for Bicycle Facilities". These guidelines will include criteria for selecting cost-effective and safety-effective bicycle facility types and a procedure for prioritizing bicycle facility improvements.

4. Bicycle compatibility shall be a goal for state highways, except on fully controlled access highways where bicycles are prohibited, in order to provide reasonably safe bicycle use.

5. All bicycle transportation facilities approved by the Board of Transportation shall conform with the adopted "Design Guidelines for Bicycle Facilities" on state-funded projects, and also with guidelines published by the American Association of State Highway and Transportation Officials (AASHTO) on federal aid projects.

Planning and Design

It is the policy of the Board of Transportation that bicycle facility planning be included in the state thoroughfare and project planning process.

1. The intent to include planning for bicycle facilities within new highway construction and improvement projects is to be noted in the Transportation Improvement Program.

2. During the thoroughfare planning process, bicycle usage shall be presumed to exist along certain corridors (e.g., between residential developments, schools, businesses and recreational areas). Within the project planning process, each project shall have a documented finding with regard to existing or future bicycling needs. In order to use available funds efficiently, each finding shall include measures of cost-effectiveness and safety-effectiveness of any proposed bicycle facility.

3. If bicycle usage is shown likely to be significant, and it is not prohibited, and there are positive cost-effective and safety-effective findings; then, plans for and designs of highway construction projects along new corridors, and for improvement projects along existing highways, shall include provisions for bicycle facilities (e.g., bike routes, bike lanes, bike paths, paved shoulders, wide outside lanes, bike trails) and secondary bicycle facilities (traffic control, parking, information devices, etc.).

4. Federally funded new bridges, grade separated interchanges, tunnels, and viaducts, and their improvements, shall be designed to provide safe access to bicycles, pursuant to the policies of the Federal Highway Administration.

5. Barriers to existing bicycling shall be avoided in the planning and design of highway projects.

6. Although separate bicycle facilities (e.g., bike paths, bike trails) are useful under some conditions and can have great value for exclusively recreational purposes, incorporation of on road bicycle facilities (e.g., bicycle lanes, paved shoulders) in highway projects are preferred for safety reasons over separate bicycle facilities parallel to major roadways. Secondary complementary bicycle facilities (e.g., traffic control, parking, information devices, etc.) should be designed to be within highway rights-of-way.

7. Technical assistance shall be provided in the planning and design of alternative transportation uses, including bicycling, for abandoned railroad rights-of-way. This assistance would be pursuant to the National Trails Act Amendment of 1983, and the resultant national Rails to Trails program, as will the Railway Revitalization Act of 1975.

8. Wherever appropriate, bicycle facilities shall be integrated into the study, planning, design, and implementation of state funded transportation projects involving air, rail, and marine transportation, and public parking facilities.

9. The development of new and improved bicycle control and information signs is encouraged for the increased safety of all highway users.

10. The development of bicycle demonstration projects which foster innovations in planning, design, construction, and maintenance is encouraged.

11. Paved shoulders shall be encouraged as appropriate along highways for the safety of all highway users, and should be designed to accommodate bicycle traffic.

12. Environmental Documents/Planning Studies for transportation projects shall evaluate the potential use of the facility by bicyclists and determine whether special bicycle facility design is appropriate.

13. Local input and advice shall be sought, to the degree practicable, during the planning stage and in advance of the final design of roadway improvements to ensure appropriate consideration of bicycling needs, if significant.

14. On highways where bicycle facilities exist, (bike paths, bike lanes, bike routes, paved shoulders, wide curb lanes, etc.), new highway improvements shall be planned and implemented to maintain the level of existing safety for bicyclists.

15. Any new or improved highway project designed and constructed within a public-use transportation corridor with private funding shall include the same bicycle facility considerations as if the project had been funded with public funds. In private transportation projects (including parking facilities), where state funding or Department approval is not involved, the same guidelines and standards for providing bicycle facilities should be encouraged.

Construction

It is the policy of the Board of Transportation that all state and federally funded highway projects incorporating bicycle facility improvements shall be constructed in accordance with approved state and federal guidelines and standards.

1. Bicycle facilities shall be constructed, and bicycle compatibility shall be provided for, in accordance with adopted Design Guidelines for Bicycle Facilities and with guidelines of the American Association of State Highway and Transportation Officials.

2. Rumble strips (raised traffic bars), asphalt concrete dikes, reflectors, and other such surface alterations, where installed, shall be placed in a manner as not to present hazards to bicyclists where bicycle use exists or is likely to exist. Rumble strips shall not be extended across shoulder or other areas intended for bicycle travel.

3. During restriping operations, motor vehicle traffic lanes may be narrowed to allow for wider curb lanes.

Maintenance

It is the policy of the Board of Transportation that the state highway system, including state-funded bicycle facilities, shall be maintained in a manner conducive to bicycle safety.

1. State and federally funded and built bicycle facilities within the state right-of-way are to be maintained to the same degree as the state highway system.

2. In the maintenance, repair, and resurfacing of highways, bridges, and other transportation facilities, and in the installation of utilities, and in the installation of utilities or other structures, nothing shall be done to diminish existing bicycle compatibility.

3. Rough road surfaces which are acceptable to motor vehicle traffic may be unsuitable for bicycle traffic, and special consideration may be necessary for highways with significant bicycle usage.

4. For any state-funded bicycle project not constructed on state right-of-way, a maintenance agreement stating that maintenance shall be the total responsibility of the local government sponsor shall be negotiated between the Department and the local government sponsor.

5. Pot-holes, edge erosion, debris, etc., are special problems for bicyclists, and their elimination should be a part of each Division's maintenance program. On identified bicycle facilities, the bike lanes and paths should be routinely swept and cleared of grass intrusion, undertaken within the discretion and capabilities of Division forces.

Operations

It is the policy of the Board of Transportation that operations and activities on the state highway system and bicycle facilities shall be conducted in a manner conducive to bicycle safety.

1. A bicyclist has the right to travel at a speed less than that of the normal motor vehicle traffic. In exercising this right, the bicyclist shall also be responsible to drive his/her vehicle safely, with due consideration to the rights of other motor vehicle operators and bicyclists and in compliance with the motor vehicle laws of North Carolina.

2. On a case by case basis, the paved shoulders of those portions of the state's fully controlled access highways may be studied and considered as an exception for usage by bicyclists where adjacent highways do not exist or are more dangerous for bicycling. Pursuant to federal highway policy, usage by bicyclists must receive prior approval by the Board of Transportation for each specific segment for which such usage is deemed appropriate, and those segments shall be appropriately signed for that usage.

3. State, county, and local law enforcement agencies are encouraged to provide specific training for law enforcement personnel with regard to bicycling.

4. The use of approved safety helmets by all bicyclists is encouraged.

Education

It is the policy of the Board of Transportation that education of both motorists and bicyclists, regarding the rights and responsibilities of bicycle riders, shall be an integral part of the Department's Bicycle Program.

School systems are encouraged to conduct bicycle safety education programs as a part of and in addition to the driver's education program, to the maximum extent practicable, and in conjunction with safety efforts through the Governor's Highway Safety Program. The Division of Motor Vehicles is also urged to include bicycle safety and user information in its motor vehicle safety publications.

Parking

It is the policy of the Board of Transportation that secure and adequate bicycle parking facilities shall be provided wherever practicable and warranted in the design and construction of all state-funded buildings, parks, and recreational facilities.

This bicycle policy revokes and replaces the former bicycle policy adopted by the Board of Transportation in November 1978. The revised bicycle policy was adopted on April 4, 1991.